

**Annual Industrial Capabilities Report
to
Congress**



February 2007

Office of Under Secretary of Defense
Acquisition, Technology & Logistics
Industrial Policy

Report Documentation Page				Form Approved OMB No. 0704-0188	
Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.					
1. REPORT DATE FEB 2007		2. REPORT TYPE		3. DATES COVERED 00-00-2007 to 00-00-2007	
4. TITLE AND SUBTITLE Annual Industrial Capabilities Report to Congress				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S)				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Office of Under Secretary of Defense,Acquisiiton, Technologies & Logistics, Industrial Policy,Washington,DC				8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)				10. SPONSOR/MONITOR'S ACRONYM(S)	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release; distribution unlimited					
13. SUPPLEMENTARY NOTES					
14. ABSTRACT					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT Same as Report (SAR)	18. NUMBER OF PAGES 96	19a. NAME OF RESPONSIBLE PERSON
a. REPORT unclassified	b. ABSTRACT unclassified	c. THIS PAGE unclassified			

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Annual Report Requirements

Section 2504 of Title 10, United States Code, requires that the Secretary of Defense submit an annual report to the Committee on Armed Services of the Senate and the Committee on Armed Services of the House of Representatives, by March 1st of each year. The report is to include:

“(1) A description of the departmental guidance prepared pursuant to section 2506 of this Title.

(2) A description of the methods and analyses being undertaken by the Department of Defense alone or in cooperation with other Federal agencies, to identify and address concerns regarding technological and industrial capabilities of the national technology and industrial base.

(3) A description of the assessments prepared pursuant to section 2505 of this Title and other analyses used in developing the budget submission of the Department of Defense for the next fiscal year.

(4) Identification of each program designed to sustain specific essential technological and industrial capabilities and processes of the national technology and industrial base.”

This report contains the required information.

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1. Introduction

The Department of Defense (DoD) acquisition community uses the term “big A” to address the larger Acquisition System—that is, the effective balancing of requirements, resources, and schedule to develop, field, and support the world’s most capable and effective military. “Little a” is the process of contracting and procurement. “Big A” implementation requires validated requirements, sufficient and stable funding, and realistic schedules, all leveraged through best value contracting methods with defined outputs and outcomes.

As described in the February 2007 *Defense Acquisition Transformation Report to Congress*, the Department has made substantial progress in improving the acquisition process for major weapons systems. However, there still is room for improvement and we have developed a *Strategic Goals Implementation Plan* for making changes. Our plans build on direction from the Quadrennial Defense Review and from recommendations in various reports such as from the Defense Acquisition Performance Assessment (DAPA).

“The existing system, however flawed, has produced the most capable, best equipped, and most effective military in the history of the world. We have met the effectiveness test in the past, now we must adapt to a different security environment. Fundamental structural changes in the Acquisition System are needed to adapt to our current security environment. An effective system requires stability and continuity that can only be achieved through integration of all the major process and elements upon which it depends. Incremental change to the acquisition process alone usually assumes that the other key processes are cohesive and stable. In reality they are disconnected and unstable.”

Lieutenant General Ronald Kadish, USAF (Ret)
Chairman, Defense Acquisition Performance Assessment Project
House Armed Services Committee
March 29, 2006

The DAPA Panel also confirmed that the industrial environment has changed in fundamental ways. Globalization and industry consolidation over the last 15 years, as well as increased outsourcing, affect the processes, strategies, and techniques required. The Panel recommended that the Department share long range plans with industry, restructure competitions to motivate industry to invest in technology and performance, evaluate the impact of industrial consolidation and its unintended effects, and address the issue of globalization of the defense industry. The Department already is tackling many of these issues—several of which are addressed in this report—and will continue to focus on the “big A” acquisition challenges of the future.

1.1 Analyzing important industry sectors

“Ideal” Industry Characteristics

The Department desires that the industrial base on which it draws be reliable, cost-effective, and sufficient to meet strategic objectives. Stable, robust, DoD funding is the primary factor in sustaining essential industrial capabilities supporting defense

because such funding focuses market demand across a broad spectrum of industry segments to meet emerging and projected DoD requirements. In the 2006 Annual Industrial Capabilities Report to Congress, the Department identified several other criteria that also can be used to evaluate the extent to which the industrial base has the desired attributes of reliability, cost-effectiveness, and sufficiency.

“DoD research, development, and acquisition, and associated policies and program decisions, play the major role in guiding and influencing industry transformation by focusing market demand across a broad spectrum of industry segments to meet emerging and projected DoD requirements.”

The Honorable Kenneth J. Krieg,
Under Secretary of Defense (Acquisition, Technology & Logistics)
Senate Armed Services Committee
September 27, 2005

A “reliable” industrial base is one in which suppliers ship contracted products and services on time. Additionally, reliable firms are viable for the long-term. Therefore, the Department would like the firms on which it draws to have a stable or expanding business base, earn fair operating margins for owners, and invest in internal research and development and capital equipment such that long-term viability, innovation, and competitiveness is likely. Finally, a reliable industrial base is one in which new, innovative, suppliers continuously enter the marketplace and compete for defense-related business.

A “cost-effective” industrial base is one in which suppliers deliver contracted products and services at or below cost targets. Cost-effective suppliers require not only stable, well-structured weapon system programs, but also optimized acquisition strategies. A cost-effective industrial base maintains an adequate number of competitive suppliers in key and emerging technology areas. In addition to the absolute number of suppliers in a given product area, another indicator of competitiveness (and cost-effectiveness) is the extent to which suppliers participate in non-defense (dual-use) U.S. markets and export products overseas. In fact, a positive trade balance within a market segment is a solid indicator that firms within that segment are world-class and provide cost-competitive products.

A “sufficient” industrial base is one in which suppliers deliver contracted products and services that meet Department performance requirements. Suppliers with sufficient industrial capabilities are flexible and react positively and quickly to changing requirements and priorities within the Department, particularly during times of conflict—indicative of the adaptability of both production lines and technology. They can effectively manage their way through requirements peaks and valleys while maintaining the ability to hire, train, and retain the specialized skills required to meet these dynamic requirements. They also have technology or technology development programs planned and/or in place to meet current and projected DoD needs.

DoD research, development, and acquisition, and associated policies, analyses, and program decisions guide and influence industry in three fundamental ways. First, DoD evaluations and assessments of sectors or specific industry-related issues help identify future budgetary and programmatic issues and inform requirements generation.

Second, the Department's weapons system acquisition policies and decisions shape the technological and programmatic focus of industry. The Department incorporates industrial base-related policies and decisions into its acquisition regulations and strategies on an ongoing basis to promote competition and innovation, and in specific cases to preserve critical defense industrial and technological capabilities. Third, decisions made on mergers and acquisitions involving defense firms continue to directly shape the financial and competitive structure of the industry.

Methodology for Evaluating Industry

To better understand the effects of its policy decisions and program decisions on industry, and the extent to which industry decisions limit or expand DoD options, the Department is finalizing baseline criteria from which to evaluate the extent to which the industry supporting defense exhibits the most important desired attributes (that is, reliability, cost-effectiveness, and sufficiency). In addition to considering funding levels and funding stability in defense market segments, contractor financial and economic metrics, competitiveness, and problem areas, the Department also is seeking to define key contractor workforce capabilities necessary for successful programs (current examples, software development and helicopter design/production) so that it can work with its industry partners to encourage long-term contractor workforce improvements. Industry segment-level baseline assessments (aircraft; command, control, communications, and computers (C4); ground vehicles; missiles; ships; and space) are summarized in Section 4 of this report; and several of the conclusions are highlighted in the discussion that follows.

Summary Segment Assessment

Stable, robust DoD funding helps determine the extent to which the industrial base has the desired attributes of reliability, cost-effectiveness, and sufficiency. Although topline DoD funding appears both steady and strong, when distributed across individual market segments, annual troughs and uneven company allotments can indicate potential problems.

For instance, within aircraft major defense acquisition programs (MDAPs), research, development, test, and evaluation (RDT&E) funding is steadily decreasing across the Future Years Defense Program (FYDP) window – from \$11B in FY06 to \$4B in FY11 (a 63 percent decrease). The primary driver is the reduction of F-35 RDT&E funding as the program transitions from the System Development & Demonstration (SDD) phase into production. To date, the Department has not announced plans for a 6th generation fighter (successor to the F-22A). Also contributing to this downturn is the Department's increased use of short-term vertical lift development programs which utilize non-developmental item airframes (for example, VH-71, CSAR-X, LUH). However, outside of the MDAP arena, there are other sources of R&D funding—from other DoD organizations and external agencies—that help to alleviate this decrease. On the other hand, aircraft procurement funding will remain relatively level over the next ten years. While Lockheed Martin and Sikorsky have current programs that will remain

in production into the next 20 years, Boeing's future participation in the fighter/attack and transport segments is more problematic. A C-17 program shutdown, coupled with the end of F/A-18E/F production in Fiscal Year (FY) 2011, may leave the industrial infrastructure at Long Beach, CA, and St. Louis, MO, with insufficient business to continue in place. The fixed wing industrial base may consolidate as military programs reduce over time. Suppliers not associated with future production programs (for example, suppliers not participating in the F-35) will be impacted the most.

The ground vehicle sector is highly dependent on supplemental funding supporting the Global War on Terrorism (GWOT). FY06 supplemental funding for vehicles was \$15.9B in addition to the Army's vehicle procurement budget of \$30.9B. The Department has maintained, and in some cases increased, the rate of overhaul and repair of the vehicles currently in Iraq and Afghanistan. Due in particular to several years of added supplemental funding and the Future Combat System (which accounts for almost 40 percent of the Army's RDT&E budget), the ground vehicle prime contractors are profitable. As a result, they are currently able to meet financial obligations, are generally consistent in providing value to shareholders, and are investing back into their businesses via independent research and development (IRAD) and capital expenditures. Once the supplemental funding ceases, this could be a much more gloomy assessment and is an area that warrants close monitoring.

Cost growth is a challenge facing the Department in many industry sectors and many individual programs, but perhaps none more than military space programs. Historically, RDT&E costs for DoD's space programs have grown by an average of 69 percent from the original development estimates, and procurement costs have risen by 19 percent on average.¹ Two space MDAPs (Space-Based Infrared System and National Polar-orbiting Operational Environmental Satellite System) faced Nunn-McCurdy cost breaches during the past year. In addition, the top three space contractors for major DoD programs all have risks for cost overruns as judged by their DoD program offices. Further, of the seven space sector MDAPs, all have reported delivery issues. The problems are related to systemic issues of immature technology and low budget estimates in space vehicle program procurement. Delivery recovery plans are in place and being implemented.

Within the shipbuilding sector, there is very little first-tier shipbuilding capacity devoted to commercial business. This places an increased overhead burden on Navy and Coast Guard shipbuilding programs which, in turn, can afford fewer and fewer ships as costs continue to rise at a rate well above inflation. In fact, U.S. commercial shipbuilding accounts for less than one percent of world commercial shipbuilding output and 80 percent of this output comes from the mid-tier sector. While U.S. shipbuilders have produced the most capable warships in the world, the January 2006 DoD-sponsored *Global Shipbuilding Industrial Base Benchmarking Study (GSIBBS), Part 1: Major Shipyards*,² reported that their shipbuilding manufacturing technology

¹ *The Long-Term Implications of Current Plans for Investment in Major Unclassified Military Space Programs*, Congressional Budget Office, September 12, 2005.

² This report is summarized in Chapter 4. It can be viewed online and downloaded at <http://www.acq.osd.mil/ip>.

improvement and productivity improvement have on average significantly lagged international yards.

Significant excess plant capacity also drives up overhead costs. The Navy's stated intention to build the Littoral Combat System (LCS) and other classes of ships in the competitive mid-tier sector may be adding additional capacity the industrial base does not need. A DoD-sponsored January 2007 report, *GSIBBS, Part 2: Mid-tier Shipyards*,³ warned that re-configuration of mid-tier shipyards to build naval ships will likely make them non-competitive in the commercial market—a fate similar to what has happened in the first-tier sector. The additional plant capacity dedicated to naval ship building also could exacerbate cost challenges in programs built in the large yards, which account for well over 85 percent of projected future shipbuilding funds.

Workforce concerns are evident in certain defense sectors. The Department is engaged in a two-part *Software Industrial Base Study* (SIBS) to assess the demand for software within the Department and the industrial base's ability to satisfy that demand. SIBS Phase 1 was completed in October 2006. Given the understanding generated about the uniqueness and complexity of software, the study concluded that the overall pool of software developers appears to be adequate. However, a supply-demand imbalance exists in the upper echelons of the software developers/ management cadres, exacerbated by the fact that this talent is not fungible outside their domain of expertise. SIBS Phase 2 is under contract to formulate and recommend solutions to the concerns highlighted in Phase 1.

Workforce concerns also exist for U.S. Government space oversight and acquisition personnel and for space manufacturing primes and subtier suppliers. The Department's Space Industrial Base Council and Executive Agent for Space are working to address this issue. The Executive Agent staff has tasked the Aerospace Corporation to begin establishing a database of space industry scientists, engineers, and program managers. This data will be used to track trends in the space workforce, establish policy, and make key program decisions.

Workforce issues remain well after hurricanes Katrina and Rita shocked shipbuilding production on the Gulf Coast. Northrop Grumman and mid-tier shipbuilders have been able to rebound, although workforce flux, and lingering absenteeism on the Gulf Coast persist as a result of post-hurricane rebuilding that is exacerbating existing workforce constraints due to aging and attrition. Additionally, the National Shipbuilding Research Program (NSRP), an industry collaboration, recently reported that workforce weaknesses in technical and academic skills persist as a result of a green replacement workforce. GSIBBS Part 2 confirms that shipbuilding capacity in the mid-tier shipyards is limited by skilled workforce constraints and not by facilities.

Finally, the unique submarine design industrial base could downsize significantly, much as happened during the United Kingdom's (UK's) hiatus from new submarine design. In the UK, this resulted in large cost overruns and schedule delays as it sought

³ This report is summarized in Chapter 4. It can be viewed online and downloaded at <http://www.acq.osd.mil/ip>.

to deliver an attack submarine class to replace an aging submarine fleet. The United States could face a similar challenge to reconstitute a design base when a replacement for the Trident class submarine is needed. RAND recently conducted a study that identified the critical skills that must be retained to sustain and reconstitute this part of the shipbuilding industrial base.

Sector-unique Concerns

Across several industry sectors, but particularly within the aircraft sector, the high demand for titanium is increasing both the cost and the production cycle time for DoD programs. As future aircraft, both military and commercial, use more titanium in their design, titanium suppliers face increased pressure to meet demand from the aircraft industry, as well as demand from other industries such as automotive, health, and industrial. The shortage of titanium, coupled with long lead times, has delayed the production of large forgings such as airframe bulkheads, landing gears, and engine components. However, proper use of the Defense Priorities and Allocations System (DPAS) could alleviate delivery delays. DPAS, codified in 15 C.F.R. 700, ensures that the Department receives priority in the market over commercial orders. DoD contractors ordering titanium or other materials can use DPAS-rated orders and include the required delivery date, not the availability date quoted by the material supplier.

In January 2006, the Department published *China's Impact on Metals Prices in Defense Aerospace*, a self-initiated study to assess the impact of rising prices and demand for militarily-critical metals and the associated cost implications to defense weapon systems acquisitions. The report concluded that China is a rising player on the global stage and is asserting significant influence in the metal markets. Due to rapid development, industrialization, and extraordinary growth, China today is the world's largest consumer of both steel (39 percent of world consumption) and aluminum (30 percent of world consumption). Direct Chinese demand for titanium in the world market is small (five percent) but growing. China's increasing demand for key materials could increase weapon system costs. While aluminum and steel prices appear to be stabilizing, it is not clear whether titanium prices are likely to increase, stabilize, or decline. The Department will continue to monitor global economic trends that may impact the Department of Defense.

Unmanned vehicles (UVs) represent a developing product segment within most industry sectors (e.g., aircraft, ground, undersea) and almost all contractors have shown some level of interest. Either by direct DoD program funding or through IRAD, contractors are developing various vehicle types to maintain a technological edge in their segment. These efforts will facilitate new developments such as collision avoidance and autonomy advances. Without operators, these unmanned systems can perform at higher thresholds and therefore require more demanding structural concepts and designs which may lead to new manufacturing processes and provide future growth opportunities. In the coming year, the Department will study UV market forces and determine what changes, if any, to DoD industrial policy are needed to preserve access to this future defense cornerstone.

Although program cost, schedule, and technical performance are the ultimate metrics that characterize defense industrial base performance, as long as the Department relies on private industry to provide products and services, then profits, return on capital, growth, and shareholders are important issues because they drive corporate behavior. They influence the incentives to which industry responds. Therefore, the Department monitors the long-term financial stability of key firms and industry segments, as well as how DoD policies may affect the firms' financial stability. The Department has been tracking the financial health of the defense industrial base for more than ten years. It continually strives to utilize the financial/economic metrics that provide the most useful insight to DoD decision makers, and most accurately reflect the industrial base's characteristics, including its ability to deliver desired programmatic outcomes.

The Department monitors financial/economic metrics for three broad categories of companies (major primes, firms otherwise critical to DoD programs, and those firms being monitored for problems) and by key industry segment. These metrics provide a financial and economic perspective of industrial base sufficiency.

- *Profitability* via Return On Invested Capital (ROIC for corporate analysis) or Return On Assets (ROA for segment level analysis) and Earnings Before Interest and Taxes (EBIT) margin,
- *Financial Risk* via ratio of Free Cash Flow to Total Debt,
- *Market Value* via Market Valuation per EBIT ratio,
- *Productivity* via EBIT-per-Employee,
- *Innovation* via Independent Research and Development Investment, and
- *Viability* via Industry Capital Expenditures.

1.2 Broad areas of interest

Defense-unique/Surge/Mobilization

Although capabilities within the industrial base supporting defense generally are sufficient to meet current and projected DoD requirements, the Department has been faced with industry segment capacity concerns centered on difficulties associated with rapidly increasing production of "important" (based on unique evolving operational scenarios) items. There always have been certain low peacetime demand, defense-unique, niche product areas where industrial capabilities are limited. These issues are even more striking when the Department endeavors to accelerate production of such an item. Problems (for example, bottlenecks) do not necessarily arise at the prime contractor level, but most often arise at the subtier supplier level. For the purpose of monitoring important subtier suppliers, the Department defines "important components" as any item that:

- Is produced by a single or sole source;
- Is used by three or more programs;
- Represents an obsolete, enabling, or emerging technology;
- Requires 12 months or more to manufacture; or
- Has limited surge production capability.

In defense-unique markets, there sometimes is little competition at the subsystem/component level. Accordingly, the Department must use many single/sole source suppliers—suppliers for which there may be minimal innovation incentive. Further, defense-unique industry segments may not be sufficiently profitable and suppliers within those segments may have an insufficient business case to justify continuing in the market. The missile/precision-guided munition (PGM) sector is a particularly apt example of a sector in which the Department is the sole customer—there is no commercial market. Therefore, many missile components qualify as “important components.” Examples include thermal batteries, tactical missile rocket motors, jet engines, inertial measurement units, global positioning system (GPS) receivers, seekers, fuzes, and warheads. Since production rates of certain PGMs likely would have to be increased significantly to fight a new conflict, many of these “important components” represent bottlenecks in the missile/PGM supplier base. In many cases, there is either limited excess production capacity to support production acceleration or if there is reserve capacity available, the time required to accelerate production to maximize facilitated rates exceeds 12 months. For example, due to increased PGM complexity, the Department may not be able to ramp-up production of standoff tactical missiles—likely to be the PGMs of choice for the next conflict—as quickly as it accelerated Joint Direct Attack Munition (JDAM) and Laser-Guided Bomb (LGB) kit production for Operations Enduring Freedom and Iraqi Freedom.

“Important” sub-tier suppliers in the space sector include nickel-hydrogen and lithium ion batteries, traveling wave tubes, space qualified solar cells, control moment gyros and radiation hardened circuits, and precision space bearings. The risk of a demand gap for RS-68 rocket engines in the next four years also is an issue to be monitored. These components are used on multiple programs and some of these components require 12 months or more to manufacture. In addition, the commercial market size is small and research investment is relatively low for these technologies.

Resetting the force, in certain ways, reflects these difficult realities. The Department now is engaged in repairing and/or replacing battle-damaged and worn out equipment, rapidly developing and producing defense-unique products such as those required for the Mine Resistant Ambush Protected (MRAP) vehicle program, and accessing any additional industrial capabilities that might be needed to meet proposed troop surge requirements.

Commercial Markets/Globalization

The vast preponderance of prime contractors supporting DoD programs are located in the United States. In FY05, the Department awarded contracts to foreign

suppliers for defense articles and components totaling approximately \$1.9B, less than one percent of all DoD contracts; and only about 2.4 percent of all DoD contracts for defense articles and components. (FY06 contract information will be available later this year.)

However, in the last two decades, the Department has increasingly utilized commercial items and services because they contain the most current and advanced technology available, allow development costs to be amortized over the broader commercial business base, and are available from numerous competitive suppliers. Commercial items are embedded in many defense-unique applications including some of DoD's most highly classified systems. The Department, in many cases, is not the predominant buyer for commercial products and has limited leverage in these markets. There is often little incentive for commercial companies to modify their procedures to meet the peculiar requirements of the government, particularly if these changes would impact the firm's competitiveness. Further, commercial industry segments such as telecommunications, integrated circuits, software, and commercial aerospace have increasingly globalized their supply chains. Supply chain globalization has increased the relevance and applicability of "Buy American" legislation as a barrier to the Department attracting innovative commercial technology. A longstanding legislative requirement for the Department to purchase only domestically smelted specialty metals is causing serious difficulties for commercial suppliers. Because circuit card assemblies may contain trace amounts of these specialty metals, the Department issued a domestic nonavailability determination covering circuit card assemblies. In addition, there are risks from supply chain globalization such as the potential for tampering and maintaining a secure supply of obsolescent commercial parts. For instance, as DoD contractors move software development work offshore for economic reasons, the potential security ramifications inherent in malicious code (e.g., Trojan horses, back doors, and time bombs) increases. In addition, the potential exists for a more strategic problem: prospective loss of intellectual capability, particularly in microelectronics, if research, development, and design work follows production work to cost-saving offshore facilities.

Anonymity may be used to effectively manage much tampering risk and ensure device reliability. And in some cases (integrated circuits), the Department has established trusted foundry sources, but this is a prohibitively expensive option for most requirements. To the extent that the Department can utilize commercial products and services, it does and will continue to do so. The Department is developing a strategic plan for maintaining future access to a reliable and cost-effective microelectronics and printed board industry with capabilities sufficient to meet DoD needs.

Export control restrictions figure prominently in certain global markets. As a consequence, the Department sponsored a study on the economic impact of export controls on the U.S. defense industrial base in four major areas: satellite manufacturing, semiconductors, machine tools, and advanced materials. In these four industries, based on available data, the investigators found that U.S.-based industry has not suffered severe economic impacts to date due to differential U.S. implementation of export controls, but this may not be the case going forward. In particular, the large

backlogs and long processing times for processing export control cases have become a serious issue for defense-related trade. More fundamentally, export controls threaten to disrupt U.S. industry's supply chain and technology development strategies, choking off promising market expansions and diversification opportunities. These qualitative factors—unreliability in supply, diversion of business investment funds to export control compliance, restricted access to foreign talent, and barriers to developing a foothold in emerging markets such as China—while hard to assess, could soon be reflected not only in lost sales but also in the overall competitiveness of leading-edge U.S. industries.

Competitiveness/Innovation

The interests of the Department are usually best served by maintaining competitive markets for required products and services. The presence of a sufficient number of capable suppliers in core defense markets fosters both competition and the innovation vital to meeting DoD's future warfighting requirements. It is Department policy to oppose business combinations that severely reduce or eliminate competition or that may create unfair competition. Some judgments are customer-centric and do not lend themselves to antitrust laws or remedies. However, the Department does examine potential ameliorating benefits ("efficiencies" in Hart-Scott-Rodino (HSR) parlance) including cost savings, technology integration, or other unique national security benefits. For example, the Department reviewed two large, complicated, proposed business combinations this past year in which competition issues played a large role.

United Launch Alliance (ULA) combined the Department's two medium-to-heavy lift launch vehicles—the Lockheed Martin Atlas V and the Boeing Delta IV Evolved Expendable Launch Vehicles. From an HSR perspective, while the Department recognized that this business combination would reduce competition, ULA presented unique national security benefits that outweighed the loss of potential competition. The Department found that the transaction would improve assured access to space through the sharing of technologies, innovative design approaches, and workforces. The combined workforce will see increased production and launch tempo and thus reduce the probability of a launch failure. In order to address certain issues, the Department supported the protections provided by a Federal Trade Commission consent order. The ULA decision is not a shift toward a more lenient business combination policy. The DoD decision to support a merger to monopoly for this transaction was unique and should not be considered as establishing a new precedent. The Department will continue to oppose business combinations that severely reduce or eliminate competition.

President Bush accepted the recommendation of the Committee on Foreign Investment in the United States (CFIUS) that he not suspend or prohibit the proposed merger of Lucent Technologies, Inc., and Alcatel, provided that, in time periods specified, the companies execute a National Security Agreement and Special Security Agreement to which they had agreed with U.S. Government agencies. In assessing the proposed acquisition's impact on national security, CFIUS conducted both a 30-day, first-stage review and a 45-day, second-stage investigation that took into account all relevant national security factors, including, but not limited to (1) the scope of Lucent's

operations and its work with state, local and federal government agencies, (2) the globalizing nature of the telecommunications industry, (3) the important research and development being conducted at Lucent's Bell Laboratories, and (4) those factors enumerated in the CFIUS governing statute, the Exon-Florio Amendment to the Defense Production Act. Based on these and other considerations, and as a strict condition for the merger to proceed, Alcatel and Lucent agreed with U.S. Government agencies to enter into the two robust and far-reaching agreements designed to ensure the protection of U.S. national security. The President's decision demonstrates the commitment of the United States to protect its national security interests and maintain its openness to investment, including investment from overseas, which is vital to continued economic growth, job creation, and an ever-stronger nation.

Services Contracts

The Department is outsourcing more and more here-to-fore government-performed functions such as research and engineering, professional, administrative and management services, and facilities-related services. In fact, in the past two years, services spending has outstripped hardware as the largest DoD spending category. The Department's processes and procedures for services acquisitions are evolving. The Department's emphasis is to ensure that it acquires services in a manner that encourages competition and innovation and does not lead to anti-competitive mergers and acquisitions or business practices. The Department is continuing to closely examine proposed mergers and acquisitions involving professional and management services that could lead to organizational conflicts of interest—such as for systems engineering and technical assistance (SETA). For example, General Dynamics' (GD's) recent acquisition of Anteon presented such an issue since Anteon provided the Department technical assistance and advice on GD contracts. Therefore, the Department sought GD divestiture of certain SETA assets before the transaction could be consummated.

Additionally, a DSB Task Force on "Defense Industrial Structure for Transformation" is examining (among other topics) the industrial base implications of increased DoD acquisition of services. The Task Force will assess whether the existing (or perhaps a more consolidated) defense industrial structure will evolve into a predominately service orientation, the implications of the emerging practice of major defense firms acquiring independent service and support providers, and the degree to which globalization of product and service suppliers should be enabled by policy and regulation. The DSB Task Force is scheduled to deliver its report by mid-summer 2007.

Industry Outreach—Expanding DoD's Ability to Attract Emerging Suppliers

The Department has a variety of forums/roundtables with which it can engage and discuss current topics of interest with existing defense contractors. However, it also is continuing to seek to better understand and address barriers to entry to the defense enterprise via an emerging Outreach to Industry initiative with current and potential defense suppliers and existing Roundtable Discussions with the investment community.

This Outreach to Industry initiative is intended to identify, evaluate, and address industry's primary areas of concern in order to expand participation by non-traditional suppliers in the defense enterprise.

The Department already is reducing certain barriers to entry for non-traditional defense companies and improving its access to commercial technology by adjusting the myriad rules, regulations, and practices that limit the use of Other Transactions Authority, Federal Acquisition Regulation, Part 12, and other programs to reach beyond traditional defense companies. The Department is establishing a Small Business Program Strategic Management System to identify the strengths and weaknesses of the DoD Small Business program.

Structural, cultural, and process improvements are enabling the Department to better research, determine, cost, and buy the products it needs. By working more effectively with industry, the Department is gaining innovation, reliability, adaptability, and agility. The Department of Defense is finding better ways to partner with industry, leverage strong small business contributions, expand the competitiveness of the defense acquisition environment, stimulate commercial creativity to develop effective solutions to defense requirements, and encourage industry to provide ever better products and personnel to support the defense mission.

2. New DoD Policy

Sec. 842 of the John Warner National Defense Authorization Act (P.L. 109-364), removes specialty metals from the Berry amendment (10 U.S.C. 2533a) and establishes a new specialty metals restriction at 10 U.S.C. 2533b.

The new law codifies current Defense Federal Acquisition Regulations Supplement (DFARS) regulations that require flow down of the specialty metals restriction to all tiers of subcontractors when acquiring aircraft, missile and space systems, ships, tank and automotive items, weapon systems, or ammunition. It restricts not only the procurement of specialty metals, but restricts procurement of the end items, and components thereof, that contain specialty metals. The Department must therefore end the practice of withholding payment while conditionally accepting end items that contain non-compliant specialty metals.

The new law retains all existing exceptions to the restrictions on procurement of specialty metals (except the exception for procurement by vessels in foreign waters), including the exception for procurements from sources in qualifying countries. In addition, it introduces two important new exceptions. The first is an exception for *de minimis* specialty metal content in commercially available electronic components. The Department has interpreted *de minimis* to be when the value of the specialty metal content in the electronic component does not exceed ten percent of the overall value of the lowest level electronic component containing the specialty metal. The second provides for a revised domestic non-availability exception when compliant specialty metal cannot be procured as and when needed “in the required form.”

The new law also provides for a one-time waiver, under certain circumstances, for items produced, manufactured, or assembled in the United States before November 16, 2006, and where final acceptance by the Government takes place after that date.

The Director, Defense Procurement and Acquisition Policy, Office of the Under Secretary of Defense for Acquisition, Technology, and Logistics, provided guidance on the new specialty metal restriction in a memorandum on December 6, 2006 (DAR 2006-O0004). The memo provides that price should be considered when contemplating a Domestic Non-Availability Determination (DNAD) for specialty metals. If the price of compliant metals is unreasonable it could be determined that compliant metal is effectively not available as and when needed.

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3. Defense Mergers and Acquisitions

3.1 Introduction

Robust, credible competition is vital to providing the Department of Defense (DoD) with high quality, affordable, and innovative products. The Department has no blanket policy of discouraging further consolidation or divestiture, or encouraging a specific industry structure. The Department believes that the competitive pressure of the marketplace is the best vehicle to shape an industrial environment that supports the defense strategy. Therefore, the Department of Defense takes action to intervene in the marketplace only when necessary to maintain appropriate competition and develop and/or preserve industrial and technological capabilities essential to defense that the marketplace, left unattended, would not. The Department evaluates each proposed transaction on its particular merits in the context of the individual market and the changing dynamics of that market.

The Department must establish, maintain, and strengthen industrial relationships that ensure that the future defense industrial base is both healthy and vital. In doing so, the Department focuses on the need to encourage competitive forces for innovation while acknowledging the need of companies to grow or combine with other firms to create new industrial capabilities essential for future warfare. Such flexibility is essential if the Department is to capitalize on the revolutionary technologies of tomorrow.

The Department reviews several kinds of business combinations involving defense suppliers: (1) proposed mergers or acquisitions filed under the Hart-Scott-Rodino Antitrust Improvement Act of 1976 (currently, transactions valued at more than \$53.1M); (2) other collaborations among competitors that have been made public (joint ventures, mergers and acquisitions) of special interest to the Department that do not meet the Hart-Scott-Rodino Act filing threshold; and (3) proposed acquisitions of U.S. companies by non-U.S. firms for which filings have been made pursuant to the Exon-Florio Amendment to the Omnibus Trade and Competitiveness Act of 1988.

3.2 Merger and Acquisition Reviews

The Federal Trade Commission and the Department of Justice (the “Antitrust Agencies”) have the statutory responsibility for determining the likely effects of a defense industry merger on the performance and dynamics of a particular market; and whether a proposed merger should be challenged on the grounds that it may violate antitrust laws. As the primary customer impacted by defense business combinations, DoD views are particularly significant because of its special insight into a proposed merger’s impact on innovation, competition, national security, and the defense industrial base. Accordingly, the Department actively works with the Antitrust Agencies.

DoD reviews are structured to identify impacts on national security and on defense industrial capabilities; evaluate the potential for loss of competition for current and future DoD programs, contracts and subcontracts, and for future technologies of interest to the Department; and address any other factors resulting from the proposed combination that may adversely affect the satisfactory completion of current or future DoD programs or operations.

In 2006, the Department reviewed more than the 43 transactions shown in the following table because the table does not include non-public transactions. Also, the Department identifies transactions for review based on potential impact and thus the below listing does not encompass all mergers and acquisitions involving companies that do business with the Department. Of those cleared by the Antitrust Agencies, several required consent orders for divestitures or other mitigation measures to protect continued competition. Several cases involved direct agreements between the parties and the Department to remedy issues outside of the antitrust mitigation process.

One transaction is of particular interest. The Department did not object to the United Launch Alliance formed by Lockheed Martin and Boeing. While the Department's policy is to oppose harmful reductions in competition, the United Launch Alliance presented a unique situation with countervailing national security benefits. The Department will continue to oppose business combinations that severely reduce or eliminate competition.

DEFENSE MERGER AND ACQUISITION REVIEWS – 2006			
Acquirer	Acquired Company	Value (\$M)*	Disposition
A. M. Castle	Transtar Metals	\$175	No Objection
Alcatel	Lucent	\$13,400	No Objection
Alion	Anteon Business Units	\$225	No Objection
AMETEK, Inc.	General Ceramics		No Objection
Apollo	GE's Advanced Materials	\$3,800	No Objection
Armor Holdings	Stewart and Stephenson	\$755	No Objection
Boeing	Aviall	\$2,050	No Objection
CACI	AlphaInsight		No Objection
EDO	CAS	\$176	No Objection
EDO	Impact Science & Technology	\$124	No Objection
General Dynamics	Anteon	\$2,234	Divest SETA Support
General Dynamics	CMC-Scranton		No Objection
General Dynamics	FC Business		No Objection
General Dynamics	SNC	\$275	In Process
General Electric	Radstone	\$244	No Objection
GKN	Stellax		No Objection
Honeywell and Rockwell Collins	Integrated Guidance Systems Joint Venture		No Objection
Inco	Falconbridge	\$19,000	Divestiture Requested; Transaction Voided
Intelsat	PanAmSat	\$3,200	No Objection

DEFENSE MERGER AND ACQUISITION REVIEWS – 2006 (CONTINUED)			
Acquirer	Acquired Company	Value (\$M)*	Disposition
L-3 Communications	Crestview Aerospace	\$135	No Objection
L-3 Communications	Cytterra		No Objection
L-3 Communications	Nautronix	\$65	No Objection
L-3 Communications	SafeView		No Objection
L-3 Communications	SSG Precision Optronics	\$67	Merchant Supply Agreement
Lockheed Martin	Aspen		No Objection
Lockheed Martin	Pacific Architects and Engineers		No Objection
Lockheed Martin	Savi		No Objection
Lockheed Martin and Boeing	United Launch Alliance	\$2,000	Consent Decree
Meggitt	Firearms Training Systems	\$144	No Objection
MTC Technologies	Aerospace Integration Corp.	\$44	No Objection
Northrop Grumman	Essex	\$580	In Process
ORBIMAGE	Space Imaging	\$59	None: Failing Firm
Precision Castparts	Special Metals Corp.	\$540	Long Term Supply Agreement
Rockwell	ESCC's Simulation Business	\$72	No Objection
SAIC	Applied Marine Technology		In Process
Science Applications International Corp	AETC		No Objection
Science Applications International Corp	bd Systems		No Objection
SES Global	New Skies	\$1,160	No Objection
Teledyne Technologies	Rockwell Scientific	\$168	No Objection
TestAmerica	STL		No Objection
Textron	Overwatch Systems	\$325	No Objection
Thermo Dynamics	Fisher Scientific	\$12,800	No Objection
Wireless Facilities Inc.	Madison Research	\$69	No Objection
Notes: * Value based on publicly available information. Source: ODUSD (IP)			

3.3 Foreign Investment in the United States

The Exon-Florio Amendment to the Omnibus Trade and Competitiveness Act of 1988 enacted Section 721 in the Defense Production Act. This section authorizes the President to suspend or block foreign acquisitions, mergers, or takeovers of U.S.-located firms when they pose credible threats to national security that cannot be resolved through other provisions of law.⁴ The President has delegated management of

⁴ Excepting the International Emergency Economic Powers Act.

the Exon-Florio Amendment to the interagency Committee on Foreign Investment in the United States (CFIUS), chaired by the Department of the Treasury.

Under Exon-Florio, the President has 30 days from the time he is notified of a foreign acquisition to initiate an investigation of the transaction. During the first 30 days after formal notification, CFIUS members conduct a preliminary review to determine whether the transaction poses credible threats to national security and, if so, whether there are means to adequately mitigate those threats under various statutes or departmental regulations. By the 30th day, the CFIUS must either approve the transaction, with or without risk mitigation measures, or initiate an additional 45-day investigation. When CFIUS completes an investigation, the President has 15 additional days to decide what action to take. The statute also requires that (1) the Department of Defense make determinations on whether the U.S. firm being acquired is engaged in the development of defense critical technology or is otherwise important to the defense industrial and technology base, and (2) the President inform Congress of his decision in each case involving a Presidential investigation.

As a statutory member of the CFIUS, the Department of Defense weighs a number of factors when it considers a proposed foreign acquisition of a U.S. company. The Department's primary objective is to ensure that the proposed transaction does not pose risks to US national security interests. To do this, the Department of Defense reviews several aspects of the transaction, including: The importance of the firm to the US defense industrial base (e.g., is it a sole-source supplier, and, if so, what security and financial costs would be incurred in finding and /or qualifying a new supplier, if required?); Does the firm to be acquired possess state-of-the art or other militarily critical technologies? Is the company to be acquired part of the critical infrastructure that the Defense Department depends upon to accomplish its mission? Is the acquiring company involved in the proliferation of sensitive technology or weapons of mass destruction and their delivery systems?

The intelligence community also prepares a risk assessment of the acquiring firm and country which evaluates: (1) their compliance with U.S. and international export control laws and other international regimes which regulate proliferation of weapons of mass destruction; (2) their potential reliability as suppliers to the defense industrial base; and (3) their support in fighting international terrorism.

As part of the Department's review of CFIUS cases, the Office of the Under Secretary of Defense (Acquisition, Technology & Logistics) determines for each transaction whether the firm being acquired possesses critical defense technology under development or is otherwise important to the defense industrial and technology base based on the outputs of the Defense Industrial Base Capability Study (DIBCS) series and other technology assessments that underlie DoD recommendations regarding export licensing regulations. Among the factors that inform AT&L's perspective on individual cases are the extent to which the transaction will facilitate the development of an integrated defense industrial base among U.S. allies and trading partners in order to increase interoperability in coalition warfare and reduce DoD

acquisition costs and whether there is strategic alignment between the objectives of the acquiring firm and the DoD.

Given the confidentiality provisions of Exon-Florio, the Department cannot publicly discuss specific reviews. Information submitted to the CFIUS is protected by law from disclosure to ensure that voluntarily-submitted, sensitive business information is not compromised.

During 2006, a review of the 113 CFIUS cases filed indicates that 12 of the transactions (10.6 percent) involved U.S. firms deemed to possess critical technologies and 17 cases (15 percent) involved U.S. firms that were determined to be otherwise important to the defense industrial base. In 23 cases, the Department, acting under industrial security regulations that apply to firms with classified facility clearances, addressed concerns about foreign ownership, control, and influence by imposing risk mitigation measures on the acquiring firms. In 15 transactions, CFIUS member agencies negotiated risk mitigation agreements unrelated to the industrial security regulations. (In some transactions, both types of mitigation were involved and/or both critical technology and industrial base importance were present.) In five cases, a 45-day investigation was initiated to supplement the initial 30-day review. The total dollar value of all 2006 CFIUS transactions was approximately \$186B with an average transaction value of \$1.6B.

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4. Industrial and Technological Capabilities Assessments

Methods and Analyses

The U.S. defense industrial base and the global defense market provide the industrial and technological capabilities which support the needs of the warfighter for capable and reliable weapon systems. The Department periodically conducts analyses/assessments to identify and evaluate those industrial and technological capabilities needed to meet current and future defense requirements. It then uses the results of these analyses/assessments to make informed budget, technology investment, acquisition, and logistics decisions.

"DoD-wide" industrial assessments evaluate and address changes in key system, subsystem, component, and/or material providers that supply many programs, and affect competition, innovation, and product availability. DoD Components conduct their own assessments when: (1) there is an indication that industrial or technological capabilities associated with an industrial sector, subsector, or commodity important to a single DoD Component could be lost; or (2) it is necessary to provide industrial capabilities information to help make specific programmatic decisions. These assessments generally are conducted, reviewed, and acted upon internally within the DoD Components. Additionally, the Defense Contract Management Agency supports DoD-wide and DoD Component industrial assessments by utilizing its broad knowledge across industrial sectors and its on-site presence in many contractor industrial facilities.

4.1 DoD-Wide

Defense Industrial Base Capabilities Study: China's Impact on Metals Prices in Defense Aerospace (January 2006)

This report, published by the Office of the Deputy Under Secretary of Defense for Industrial Policy (ODUSD(IP)), concluded that China is a rising player on the global stage and is asserting significant influence in the metal markets. Due to rapid development, industrialization, and extraordinary growth, China today is the world's largest consumer of both steel (39 percent of world consumption) and aluminum (30 percent of world consumption). Direct Chinese demand for titanium in the world market is small (five percent) but growing. China's increasing demand for key materials could increase weapon system costs. Therefore, ODUSD(IP) will continue to monitor global economic trends that may impact the Department of Defense. The report is posted on the ODUSD(IP) website (<http://www.acq.osd.mil/ip/>).

Global Shipbuilding Industrial Base Benchmarking Study Part 1: Major Shipyards (January 2006)

ODUSD(IP) contracted with the world-recognized shipbuilding consultancy firm First Marine International, Limited (FMI) to support a Global Shipbuilding Industrial Base Benchmarking Study (GSIBBS) in early 2004 and reported the results to Congress in January 2006. This study compared the practices of U.S. and selected leading international commercial and naval shipbuilders in Europe and Asia and identified specific changes to U.S. shipbuilding industry processes and to U.S. naval design and acquisition practices that could improve the performance of the shipbuilding enterprise.

The study found that the overall average best practice rating for the six major U.S. yards had increased from 3.1 (5.0 scale) in 1999/2000 to 3.6 in 2004. This lagged the rates of improvement demonstrated by the top international commercial builders, yet, confirmed that there has been a marked increase in the rate of improvement in the U.S. yards over the previous five years. This was the result of substantial capital expenditure by some yards and a concerted, industry-wide effort to employ higher levels of technology. Some U.S. yards had clear strengths and the benchmarking team was impressed by the improvements that resulted from their efforts over the previous five years.

The study estimated U.S. shipyard productivity using a combination of proprietary and public domain data. The estimates took vessel complexity and the additional work that the shipyard is required to do as a consequence of working on government, rather than commercial, contracts into account. This has been named the “customer factor” and was estimated to be between 10 and 15 percent for most U.S. naval vessel types. The analysis indicated that there was a wide range of productivity being achieved across the industry and that the core productivity of some yards compared quite well to builders of similar vessels overseas. The performance drop-off that occurred on a first-of-class vessel, however, appeared to be much higher. The study report contains suggestions for improvements that can be effected through industry collaboration. Also, suggestions for individual yards were made in proprietary shipyard reports. The study reports have proven useful to industry and have also served to provide a facility restoration priority list for Gulf Coast shipyards, endorsed by the Navy, to utilize in yard reconstitution following Hurricane Katrina.

Foreign Sources of Supply: Assessment of the United States Defense Industrial Base (April 2006)

Section 812 of the National Defense Authorization Act for Fiscal Year 2004 (Public Law 108-136) directed the Secretary of Defense to establish a program to assess the degree to which the United States is dependent on foreign sources of supply; and the capabilities of the United States defense industrial base to produce military systems necessary to support the national security objectives set forth in section 2501 of Title 10, United States Code. In meeting the requirements of Section 812, the

Department is to use existing data for the assessment program. The Department is to submit to the Congress an annual report on the assessment program covering the preceding year.

The April 2006 report was based on three separate assessments that collectively provide visibility into the extent and impact of foreign suppliers: (1) an assessment of FY05 DoD prime contracts valued at over \$25,000 for defense items and components, (2) a 2004 assessment of foreign content in certain defense systems, and (3) a January 2006 assessment of defense trade by the Government Accountability Office (GAO).

The report concluded that the Department employs foreign contractors and subcontractors judiciously, and in a manner consistent with national security requirements. In FY05, the Department awarded contracts to foreign suppliers for defense articles and components totaling approximately \$1.9B, less than one percent of all DoD contracts; and about 2.4 percent of all DoD contracts for defense articles and components. The report is posted on the ODUSD(IP) website (<http://www.acq.osd.mil/ip>).

Case Study of a Critical Sole Source Supplier (June 2006)

During a 2005 Missile Defense Agency (MDA) solid rocket motor (SRM) industrial assessment, Sartomer Company, Inc. informed the Department that it might be forced to leave the SRM business as early as the end of calendar year 2006. Sartomer, a sole source domestic producer, supplies all Hydroxyl-Terminated Polybutadiene (HTPB) polymer used by DoD, NASA, and commercial space for solid rocket motor propellant and munitions. Sartomer produces two basic formulations of the HTPB polymer; a HTLO product that is predominantly commercial and a R45M product that is defense unique. Both are used in DoD solid rocket motors. Sartomer's production facility in Channelview, TX needed between \$7-15M in capital investments to meet emerging Environmental Protection Agency requirements and to make efficiency improvements. There were no additional domestic providers of this product.

Initially, Sartomer's parent company, Total, based in France, only agreed to fund a total of \$3M over a three year period due primarily to low profitability and their ability to meet commercial customer's needs from their foreign production sites. However, under current approved practices/procedures, the DoD/NASA programs using this product would have been required to re-qualify their manufacturing processes for the new site, including test firing assembled solid rocket motors. Hence, if there were a change in the supplier for HTPB, those programs affected would incur substantial re-qualification costs and schedule delays. In terms of market share, the DoD/NASA requirements account for roughly five to ten percent of Sartomer's business limiting DoD leverage. Without additional funds, Sartomer could be forced exit the HTPB defense business, leaving the solid rocket motor and munitions producers without a qualified supplier.

ODUSD (Industrial Policy) met with Sartomer to discuss the likelihood that it would remain in the business and to explain the Department's practice to let its prime contractors resolve industrial issues. In addition, the Department queried its prime contractors to better understand the industrial impacts if Sartomer left the business. Their responses verified that the cost and schedule impacts would be significant.

Before the Department established a position, Sartomer's parent company agreed to make the necessary investments and it was not necessary for the Department to take remedial action.

Software Industrial Base Study (October 2006)

This two-phase study was sponsored by the Office of the Secretary of Defense to address the demand for DoD software and the industrial base's ability to satisfy that demand.

Phase I of the study concluded:

1. Although there currently are some problems in meeting software demand, particularly for specific skills, the situation for major customers such as the Department of Defense and the large aerospace companies is not now a major problem.
2. Data on employment demand are difficult to obtain, particularly when categorized by relevant skill areas; and those data and projections that exist are often ambiguous beyond the near-term.
3. Most longer-term projections forecast a gap between supply and demand that is larger than exists today. However, the size and the scope of the gap are not clear.
4. Potential problems in meeting future DoD demand are influenced by the need to employ U.S. citizens and permanent residents who can obtain security clearances.

Given the understanding generated about the uniqueness and complexity of software, the study highlighted that the overall pool of software developers appears to be adequate. However, a supply-demand imbalance exists in the upper echelons of the software developers/management cadres, exacerbated by the fact that this talent is not fungible outside their domain of expertise.

Phase II of the Software Industrial Base Study (SIBS) will focus on technical solutions to issues highlighted during Phase I activities.

DoD Fuze IPT Industrial Capabilities Assessment of Fuze Sub-tier Contractors (November 2006)

The Office of the Under Secretary of Defense (Acquisition, Technology and Logistics) initiated this assessment through the Department's Fuze Integrated Product Team (IPT). The IPT requested the Defense Contract Management Agency's (DCMA) Industrial Analysis Center (IAC) to conduct a comprehensive industrial capability assessment of certain fuze sub-tier manufacturers (12 in total) to assist the IPT in refining its strategic planning and to assess the risk to current and future capabilities of the fuze industrial base. Fuzes are essential elements of all munitions. They not only are essential for munitions reliability and safety; they also are essential for munitions lethality.

The assessment examined the capabilities, capacities, and financial viability of key sub-tier fuze manufacturers to determine their viability to support future DoD requirements. The assessment concluded that these 12 sub-tier producers have the capacity and the capability to meet near-term DoD requirements. All of the contractors were rated a moderate industrial risk because they are single/sole source suppliers of specialty fuze components.

The assessment noted that the collective business base of fuze components for these contractors make up only about eight percent of their total business, leaving the Department little leverage in precluding the contractors from discontinuing unique fuze components that have practically no purpose outside of defense applications. The report also noted that, collectively, most of these contractors were experiencing excess capacity and there was a lack of research and development funding in this sub-sector. Despite these trends, the management officials of this group of subcontractors stated that they are committed to serving the DoD community in providing the fuze components for current and future requirements.

The study noted that none of the 12 assessed sub-tier contractors are in eminent danger of failing to supply products for our warfighter needs. In some cases, the Department is taking steps to qualify second sources for important components. The report recommends that the Office of the Secretary of Defense and the Services:

- continue working to award multi-year, multi-source awards
- increase fuze research and development (science and technology) funding for both Government and industry, and
- continue monitoring to anticipate vulnerabilities and take necessary action to ensure future fuze components are reliable.

The Department's Fuze IPT is considering these recommendations.

DoD Fuze IPT Industrial Capabilities Assessment of the Fuze Prime Contractors (November 2006)

The Office of the Under Secretary of Defense (Acquisition, Technology and Logistics) initiated this assessment through the Department's Fuze Integrated Product Team (IPT). A subgroup of members of the IPT conducted an assessment of eight Fuze Prime Contractors that account for roughly ninety percent of the fuze industry business base. The assessment focused on identifying industrial capabilities within the fuze base that were at risk of being lost. The analysis included identifying the contractors' current and probable future fuze acquisition business. With this information, the subgroup projected each producer's financial health thereby forecasting the risk of loss associated with the competencies and capabilities that those contractors bring to the Base.

1. At least two fuze producers appear to be in danger of receiving less business than their stated minimum sustaining fuze business income. Continued monitoring of these companies is required.
2. The IPT noted that many companies are being sustained by single fuze programs, many of which are for legacy products unrelated to advanced fuzing.
3. Some fuze manufacturers are getting into the system contractor business which may help sustain their competencies.
4. There are just two contractors (of the eight main producers) that have been judged as capable of designing and producing the wide range of advanced fuzes that will be needed for the next generation of future munitions. There likely is not enough procurement in advanced fuzing to keep either solvent. Both are forced to compete for legacy contracts to survive.

The study concludes that further consolidation of the Fuze Base is likely, and thus continued annual assessments are warranted to ensure shortfalls in fuze competencies and capabilities are anticipated in sufficient time to preclude negative impact to the warfighter.

Identification and Assessment of Military System Essential Items (November 2006)

Section 813 of the National Defense Authorization Act for Fiscal Year 2004 directs the Secretary of Defense to establish a process to identify military system "essential items" and create a Military System Essential Item Breakout List (MSEIBL). The law then requires the reporting of, among other items, information on the military systems represented; the military and commercial items on the list; and the use of foreign suppliers for the items on the list. The Department provided the required information in its second annual report to Congress in November 2006.

The Department determined that an item is essential if it is required for a system to perform the tasks for which it was designed or if its absence would jeopardize the lives of the system operators. The MSEIBL contains 260,881 essential items, representing 7.2 percent of all 3,631,392 stock-listed items managed by the Defense Logistics Agency (DLA). It contains items sourced for the 115 weapon systems designated by the Services as most critical. Only 2,093 items (0.8 percent of the database) were procured from foreign sources. Of these items, 87 percent were procured from suppliers in the United Kingdom.

The Department advised Congress that the information required by Section 813 of Public Law 108-136 is of limited utility for DoD procurement decisions.

Report of the Interagency Team on Consultations with Foreign Nations on Limiting the Adverse Effects of Offsets in Defense Procurement (December 2006)

Section 7 (c) of P.L. 108-195 required an interagency team to consult with foreign nations on limiting the adverse effects of offsets in defense procurement without damaging the economy, defense industrial base, defense production, or defense preparedness of the United States. The interagency team was comprised of representatives of the Departments of Defense, Commerce, Labor, and State, and the U.S. Trade Representative. The interagency team released its third and final annual report to the Congress in January 2007.

The General Findings of the report were:

1. Most nations purchasing defense systems demand offsets.
2. Offsets are persistent and increasing.
3. Offsets in their many forms may never be completely eliminated.
4. Most national offset policies are executive branch policies, usually not found in law. They range from the explicit to the customary. The ministries of defense in the consulted countries are concerned that offsets unduly increase the price of weapons systems.
5. Many nations believe that the United States has a de facto offsets policy; most foreign systems that it purchases are produced in the United States. Many nations note that offsets are necessary to mitigate U.S. domestic preferences.
6. Some countries believe that the United States is enforcing its export control regime in a protectionist manner.
7. U.S. domestic entities' perceptions on offsets are both positive and negative, depending on whether work is gained or lost as a result of a successful defense sale and its associated offset.

Based on its findings, the interagency team recommended that:

1. The United States should continue to consult and dialogue with nations and international organizations involved with offsets. The goal of these consultations and dialogues should remain the same, utilizing the existing Department of Defense-led interagency approach. The consultations and dialogues should include all potentially affected national ministries and departments, and always include the ministries or departments of defense.
2. Nations demanding offsets should be encouraged to give contractors maximum flexibility in fulfilling offset requirements so they can make sound business decisions.
3. More international cooperative projects should be encouraged because they do not require offsets among the partnering nations. Participation of national contractors should be based on competition and best value.

Global Shipbuilding Industrial Base Benchmarking Study Part 2: Mid-tier Shipyards (January 2007)

This follow-on study, also conducted by FMI, focused on shipyards in the mid-tier shipbuilding sector. FMI completed their analysis late in 2006 with report delivered early in 2007. The study concluded the overall average best practice rating of the U.S. mid-tier shipyards lags significantly behind the international yards average. Some U.S. yards, however, scored well and led the international yards in a number of shipbuilding processes.

The study also concluded that, although the strategy of using mid-tier yards for naval construction has many positive features including increased shipbuilder sourcing options available to the Navy and competition in the industrial base, there is a limit to the sector's capability and capacity. The study warned that the structure of the projects, the steep learning curve and the change in culture required to deal with naval work may limit the ultimate cost savings, particularly on vessels early in a series. Furthermore, placing work outside the established naval shipbuilding industrial base reduces the ability to spread the overhead costs created by the existing excess capacity. Also, the change in culture necessary for mid-tier yards to be successful in the naval sector requires changes that would adversely affect their commercial competitiveness.

4.2 Army

Artillery Illumination Cartridges (January 2006)

The Army completed an assessment of how best to ensure adequate capabilities to produce illumination cartridges. The Army determined that it could best protect essential industrial and technological capabilities by restricting certain procurements to sources in the United States and Canada. Specifically, the Army decided to acquire 150,000 each, 105mm M314A3 Illumination Cartridges, with an estimated value of \$107,962,563, via an other than full and open competition, pursuant to the authority of Title 10 United States Code Section 2304(c)(3). The result will be an assured supply base for illumination cartridges.

Conventional Ammunition Congressionally Required Assessment (February 2006)

The Army assessed the industrial base for conventional ammunition in response to a Congressional request and submitted a broad report. The Army review identified needed improvement at production facilities and also identified single points of failure. In several instances, this led to findings that specific investments in facilities and restricted procurement were the best approach to protect essential industrial and technological capabilities and ensure adequate capacity would be available in the event of a national emergency or mobilization. In FY06, per the above obligation placed on the Single Manager for Conventional Ammunition (SMCA), there were 86 SMCA section 806 acquisition determinations assessed and approved by SMCA totaling over \$6067M. Eighteen procurements were restricted to the National Technology and Industrial Base (NTIB). Their restriction represented a value to the NTIB of \$1568M. Twenty-five procurements had components acquisitions that were restricted to the NTIB. These component acquisitions represented \$2107M of the \$6067M. Restricted procurements were generally still competed but limited to suppliers within the North American Industrial base, comprised of the United States and Canada. The larger dollar value specific actions to restrict competition to protect essential industrial and technological capabilities have been identified above.

Advanced Threat Infrared Countermeasures/Common Missile Warning System Industrial Capabilities Assessment (March 2006)

The Army performed an industrial capabilities assessment on the Advanced Threat Infrared Countermeasures/Common Missile Warning System (ATIRCM/CMWS). The purpose of the assessment was to evaluate the industrial base's capability to produce, maintain and support the CMWS. In order to perform this ICA, the Communications-Electronics Life Cycle Management Command (C-E LCMC) Industrial Base Office (IBO) relied on in-house resources and the Product Manager, Infrared Countermeasures, for program data from key suppliers. The IBO evaluated critical

technologies for maturity level and their ability to meet system requirements. In addition, the IBO made a site visit to the prime contractor facility.

The C-E LCMC IBO reviewed the parts ordering processes and evaluated the technical capabilities and fiscal status of the CMWS prime contractor (along with applicable sub-contract vendors).

From an industrial perspective, the CMWS Program was rated low risk for entering Full Rate Production since the hardware equipment that composes the system had not experienced any technical or production delays during Low Rate Initial Production. Both the CMWS prime contractor, BAE Systems, and its subcontractors had previously demonstrated during the Low Rate Initial Production contract that they could successfully meet customer contractual commitments within the scheduled timeframes for the established production goals. BAE quality control and manufacturing processes are ISO9001 (Quality Management Systems) compliant which further addresses risk mitigation by establishing auditable manufacturing processes. The IBO also reviewed financial risk via business information reports obtained on the prime contractor and several sub-contractors. There were no financial risks or issues identified in the reports. The IBO also judged the software engineering risk associated with the complex CMWS software to be low risk.

High Explosive (HE) Mortar Cartridge (March 2006)

The Army completed an assessment of how best to ensure an adequate production base for 60mm, 81mm, and 120mm High Explosive (HE) Mortar Cartridge Load, Assemble, and Pack. The Army decided to restrict award to sources in the United States and Canada. As a result the Army awarded contracts for \$137,207,869 on an other than full and open competition basis pursuant to the authority of Title 10 United States Code Section 2304(c)(3) and a contract for \$85,824,847 to buy 120mm High Explosive and Full Range Practice Mortar Cartridges on an other than full and open competition basis pursuant to the authority of Title 10 United States Code Section 2304(c)(3). The result will be an assured supply base for Mortar Cartridges.

Modular Artillery Charge System (April 2006)

The Army completed an assessment of how best to ensure an adequate production base for the 155mm Modular Artillery Charge System. As a result, the Army determined it was necessary to award a contract in 2006 for \$37.10M on an other than full and open competition basis pursuant to the authority of Title 10 United States Code Section 2304(c)(3). The total estimated value of the approval authority, as amended, is \$96.4M. This approach will ensure a supply base for the 155mm Modular Artillery Charge System.

Secure Enroute Communications Package – Improved Industrial Capabilities Assessment (June 2006)

The Army C-E LCMC IBO also performed an industrial capabilities assessment on the Secure Enroute Communications Package – Improved (SECOMP-I). The main objective of this study was to evaluate the industrial base's capability to produce, maintain, and support the SECOMP-I. To accomplish this, C-E LCMC IBO: (1) identified the sources of supply for major components of SECOMP-I; (2) assessed their capability to produce and support those components; and (3) identified any critical resource constraints. In order to perform the ICA, the C-E LCMC IBO relied on in-house resources and Project Manager, Warfighter Information Network-Tactical to provide program data from key suppliers. The IBO evaluated critical technologies for maturity and their ability to meet system requirements. The IBO obtained additional information from the prime contractor.

The C-E LCMC IBO evaluated the technical capabilities and fiscal status of the SECOMP-I prime contractor, along with selected subcontractors. The IBO also included software processes, logistics and depot support, and obsolescence management. The IBO also reviewed financial risk via business information reports on the prime contractor and several sub-contractors.

From an industrial perspective, the SECOMP-I Program was rated low risk for entering Full Rate Production since the hardware equipment that comprises the system had not experienced any technical or production delays over the course of Low Rate Initial Production. The prime contractor, and associated sub-contractors, had demonstrated during the early technical builds that they can successfully meet customer contractual commitments within the scheduled timeframes for the established production goals. Their Integrated Logistics Support approach has successfully provided support for several large-scale Army programs. Additionally, there were no major financial risks or issues identified in business information reports. However, the IBO assigned moderate financial risk ratings to about one-third of the small to mid-size vendors. The reviews of the SECOMP-I Supportability Strategy by both the Program Office and the prime contractor substantiate the low risk assessment rating. Also, the software engineering risk associated with the SECOMP-I program is judged to be an overall low risk. The only identified areas of concern were some reliance on foreign sources, and the possibility of growing obsolescence issues due to the extensive use of Commercial Off-the-Shelf hardware.

M793, M794, M910, and M788 Medium Caliber Ammunition (July 2006)

The Army completed an assessment of how best to ensure an adequate production base for 25mm and 30 mm medium caliber ammunition. As a result, the Army determined the best approach to be restricting awards to sources located in the United States and Canada for these cartridges for FY07 through FY11 for a total estimated contract cost of \$324,002,208, on an other than full and open competition basis pursuant to the authority of Title 10 United States Code Section 2304(c)(3). The result will be an assured supply of medium caliber ammunition.

Communications-Electronics Life Cycle Management Command (C-E LCMC) Electro-Optics Industrial Base Sector Study (September 2006)

The Army C-E LCMC IBO performed a sector study of the electro-optics industrial base. Due to the increased focus on Homeland Security, Operation Iraqi Freedom and Operation Enduring Freedom, the demand and interest in Electro-Optics (EO) technology has greatly increased. This report examined the capability of the EO industry sector (private and organic) to develop, manufacture, and support legacy and future weapon systems used by the warfighter. EO systems rely primarily on defense contractors to provide advanced, critical technologies that are not procurable from the commercial base. Army EO systems in this study included various forms of night vision and thermal imaging equipment.

The defense contractor base for the EO sector is financially healthy. However, obsolescence and long delivery times are common issues for the maintenance and rebuilding of legacy EO equipment at the Army's depots and defense contractor facilities. Critical items identified include high-purity raw glass, image intensification tubes, optical coatings, optical filters and circuit card assemblies. There is significant foreign dependency for technology used in EO systems. Image intensification tubes used in night vision equipment rely on foreign, sole-source vendors for high purity raw glass and precision optical components.

Global Broadcast Service (September 2006)

The Army C-E LCMC IBO performed an industrial capabilities assessment on the Global Broadcast Service (GBS). The main objective of this assessment was to evaluate the industrial base's capability to produce, maintain and support the GBS program. In order to perform this ICA, the C-E LCMC Industrial Base Office (IBO) relied on in-house resources and Project Manager, Warfighter Information Network-Tactical to provide program data and documentation.

The C-E LCMC IBO evaluated the technical capabilities and fiscal status of the GBS prime contractor, along with applicable sub-contract vendors. The IBO also included software processes, logistics, depot support, and obsolescence management.

The IBO also reviewed financial risk via business information reports on the prime contractor and several sub-contractors.

From an industrial perspective, the GBS program was rated low risk for entering Full Rate Production since the hardware equipment and integration had experienced few technical or production delays over the course of Low Rate Initial Production. However, the IBO had some concerns relating to sole source items and reliance on foreign sources for critical items. Production capabilities and software engineering are both considered low risk. There were no major financial risks or issues identified in the business information reports. However, the IBO assigned moderate financial risk to about one-third of the small to mid-size vendors.

Small Caliber Weapons Sector Study (September 2006)

The Army Tank-automotive and Armaments Life Cycle Management Command performed an industrial capabilities study on the small caliber weapons sector. The small caliber weapons industrial base is considered stable through FY06, and is believed to be capable of supporting the future requirements of the Army. However, the Global War on Terror (GWOT) has depleted some stocks and replacement weapons are required. The Army preserved critical elements within the small caliber weapons base by improvements to current arms, overhaul of fielded weapons, production of spare and repair parts, and the production of small arms. Competitive market forces will determine the shape and composition of the small caliber sector beyond FY06. There are three major domestic producers of small caliber weapon systems within the small caliber sector: Colt Manufacturing, Hartford, CT; FN Manufacturing, Columbia, SC; and General Dynamics Armament and Technical Systems, Saco, ME (formerly Saco Defense). All three companies have ongoing U.S. Government contracts for small arms systems that will support production through FY06 and thus provide a warm base for production of the M4 Carbine Family of Weapons (FOW); the M16 Rifle FOW; the M240 Squad Automatic Weapon FOW, and the M249 Light Machine Gun.

Given the depth of the domestic manufacturing base for small caliber weapons and Army's depot capability, and the expected demands for small arms, the sector is considered to be in a stable condition with the outlook very positive as industry and Anniston Army Depot ramp up production to meet the currently higher emergency demands due to the GWOT.

4.3 Navy

Vertical Take-Off and Landing Unmanned Aerial Vehicle Industrial Capability Assessment (July 2006)

The Navy asked Defense Contract Management Agency (DCMA)'s Industrial Analysis Center (IAC) to perform an analysis of the Vertical Take-off and Landing Tactical Unmanned Aerial Vehicle (VTUAV) programs industrial base to assist its scheduled Defense Acquisition Board (DAB) Milestone C Review. Emphasis was placed on assessing industrial capabilities required to successfully execute moving the VTUAV program to Milestone C.

Although several Industrial and Technology risks were identified, none presented a high, or unacceptable risk. Each contractor assessed could support additional workload, with one exception, and sufficient capacity will be available to support the VTUAV. Based on the DoD procurement budget for the next decade, the sub-tier industrial infrastructure supporting the unmanned aerial vehicle industrial base is projected to increase in size, and will be capable of supporting all DoD unmanned aerial vehicle programs.

Expeditionary Fighting Vehicle Depot Source of Repair Hydraulic Systems (September 2006)

In January 2002, the Direct Reporting Program Manager, Advanced Amphibious Assault (DRPM AAA) and the DCMA IAC entered into a Memorandum of Understanding (MOU) to address depot level core capability and to assess risk for repair and overhaul of systems and sub-systems of the Expeditionary Fighting Vehicle (EFV). The objective is to identify core capabilities and cost-effective sources of repair for key EFV hydraulic components. The analysis also includes commercial item identification and financial information to support a best-value analysis.

Hydraulic systems and components are widely and commonly used in commercial and military applications and are repaired routinely in many DoD depots. The hydraulic domestic industrial base, which includes many manufacturers and repair shops, is extensive and healthy. All the Original Equipment Manufacturer (OEM)s listed in the study repair the products they produce and the DoD military services maintain repair depots and facilities that perform hydraulic repairs on a variety of complex systems and components.

Marine Corps Maintenance Centers Barstow and Albany, and the Army depots at Anniston and Red River possess the capability to repair hydraulic systems and components for ground vehicles and are only a sample of the DoD capability. The repairs and maintenance being conducted at the major combat vehicle depots support similar capabilities required to perform repair and overhaul EFV hydraulic components. Some of the unique hydraulic components fixtures/equipment is government owned;

and once production has ended, relocating excess equipment to other depots is a viable option. The study recommended that the Marine Corps depots develop work share arrangements with the OEMs to ensure proper repairs and overhauls. Partnering also would ensure availability of internal spare parts from the OEMs for timely repairs.

Technology and Industrial Base Assessment for the Littoral Combat Ship Milestone "B" (October 2006)

The Department of the Navy (DoN) conducted this assessment starting in July 2006 to analyze the industrial base capability to support the Milestone "B" Littoral Combat Ship (LCS) acquisition strategy of any construction of up to six ships per year. The study evaluated the three current LCS construction shipyards (Marinette Marine Corporation (MMC) and Bollinger Shipyards Incorporated (BSI) of the Lockheed Martin team and Austal USA of the General Dynamics team). Bath Iron Works (BIW) of the General Dynamics team was also assessed as a future LCS shipyard. Key suppliers in supporting industries for both teams were also assessed.

Key findings indicate that the FY07 (two ship) and FY08 (three ship) awards provide opportunities and time for the shipyards to address the ramp-up required to support the FY09 multiple ship awards. Each of the three shipyards would require expansion and upgrades to production facilities and roughly double to triple its current skilled workforce if that one shipyard was to build all six ships starting in FY09. An even distribution between the current LCS yards reduces both the facility upgrades and workforce size needed, and the associated risks. The post-Katrina employment conditions in the Gulf Coast region present significant challenges for BSI and Austal to reach required manning levels. The Shipbuilding Supporting Industry study included analysis of 31 key companies supplying the LCS and over 17 steel and aluminum suppliers. The supporting industry was found to be fully capable of supporting a two-team award with most companies being able to support the highest demand of an award of all six ships to one team. The few exceptions had either alternate suppliers or equivalent replacements and therefore, were not considered prohibitive.

From FY05-08, there will be nine ships constructed/initiated by the three current LCS shipyards. This experience and partial ramp-up facilitates the transition into the increased acquisition rate of FY09 and the needed workforce and facility upgrades. Therefore, this assessment concludes that there is moderate but manageable risk with the teams' ability to execute a Milestone "B" Strategy using the least risk scenario of even distribution of awards between the three current LCS shipyards and a moderate to high risk with award to only one team. The Shipbuilding Supporting Industry Sector, with a few manageable risks, was found fully capable of supporting LCS Milestone "B" requirements.

After recently identifying significant cost overruns on LCS 1 (a Lockheed Martin ship being constructed at MMC) the DoN on January 12, 2007 stopped work on LCS 3, the second Lockheed Martin ship to be constructed at BSI. The DoN is examining the root causes of the cost growth and is developing recommendations including options for the future LCS acquisition strategy.

Directed Infrared Countermeasure Industrial Capability Assessment (November 2006)

The Navy asked DCMA IAC to conduct an industrial capability assessment on the Directed Infrared Countermeasure (DIRCM) system. The assessment addressed the domestic and international industrial base for DIRCM production and provided a baseline of industrial capabilities and financial stability of the industrial base supporting DIRCM, identifying risks and surge potential of industry. The study supports the Navy's Milestone B Defense Acquisition Board (DAB) review.

The analysis verified a rapid maturing of critical technologies, especially in the area of laser advancements and turret designs. This industry sector has benefited considerably from government incentives and the likely need to equip civilian air fleets with DIRCM systems. There is a rapidly growing domestic and international DIRCM industrial infrastructure due to the unique ability of DIRCM systems. The study concluded that this sector was a low industrial base risk.

Expeditionary Fighting Vehicle (EFV) (November 2006)

The Marine Corps asked the DCMA IAC to perform an industrial capability assessment of the prime and key subcontractors to support the Milestone "C" DAB review of the Expeditionary Fighting Vehicle (EFV). The assessment included 75 prime and subcontractor locations.

The study concluded that there is one high and one moderate industrial base risk. The high risk identified is the X4560 Transmission and Power Transfer Module. The identified moderate risk is the MK 44 Chain Gun. The assessment identified five subcontractors as high program risks and ten as moderate program risks that could potentially have an adverse impact on the EFV production phase of the program schedule; and recommended all be monitored throughout the production phase of the contract.

Subsequent to the conclusion of the assessment and site visits, the Marines reduced the size of the EFV program from 1,013 to 573 vehicles and the full rate production quantity of 120 vehicles per year to 55. A follow-on assessment is in process to assess the impact of the reduction on the industrial base.

Annual United States Microwave Tube Industry Status Assessment (December 2006)

The Department of Defense's (DoD) requirement for microwave tubes to support operation of active communications electronic warfare and radar systems is essentially met by three U.S. companies: Communication and Power Industries (CPIII), L-3 Communications (L-3 COM) and Teledyne Electronic Technologies (TET).

Consolidations/contractions of niche areas continue in the industry through mergers and acquisitions. DoD Science & Technology funding continues to decrease with the Air Force Office of Scientific Research (AFOSR) supporting the on-going Multi-disciplinary University Research Initiative (MURI) for high voltage and cathode work, and the Naval Research Laboratory (NRL) funding internal research efforts.

Operational requirements continue to expand beyond the current operational frequency, power, and instantaneous bandwidth with Research & Development funding responsibilities being left to the Program Management Office or industry. Industry dependence on some critical, but small volume, foreign-supplied materials is being evaluated for The Berry Amendment conformance. Availability of critical/sensitive space-borne traveling wave tubes from the sole U. S. supplier also is currently under review for potential external help.

Although service operational tempo remains high, acquisitions have become intermittent affecting the work flow planning of the industry. The Office of the Secretary of Defense (OSD) funded "Next Generation Manufacturing Initiative," recommended the Department lead microwave tube lead research and development efforts in modeling and simulation, as well as for performance upgrades. The business case development for these efforts will be completed in the summer 2007.

As the DoD's equipment acquisition and sustainment efforts are consolidated, the U. S. microwave tube industry is being migrated to a component supplier role in the DoD supply chain. However, microwave power tubes remain a critical industrial capability.

4.4 Air Force

Air Force Materiel Command Aerospace Metals Analysis (February 2006)

The Air Force conducted this study in response to recent difficulties in procuring a variety of metal products to support repair and maintenance operations at Air Force Air Logistics Centers. The goal of the study was to identify causes and make recommendations to improve availability, procurement lead-times, and costs of steel, aluminum, and titanium.

Material lead-times are, for the most part, a function of raw material availability, demand (both commercial and military), whether or not the material is stocked, and mill-run times. Mills produce specific metals/alloys in runs of a few days to weeks in length, sometimes as infrequently as a few times a year for low demand, specialty materials. If an order is placed after the mill run for the required material takes place, the customer must wait until the next mill run for that material, which significantly increases the lead-time. Material lead-times vary widely among various types and forms (bar, plate, tube, forging) of aerospace materials. The average lead-time for a manufacturer to purchase aerospace materials (steel, aluminum and titanium) is 21 weeks. Lead-times have increased an average of 15 percent over the past two years.

In 2005 and early 2006, costs increased across the entire range of materials by as much as 180 percent due to a combination of increased demand and rising energy costs. Aerospace materials are in high demand primarily due to an upswing in the commercial market driven by new products such as the Airbus A380 and Boeing 787. Metal costs have started to level off as additional capacity has been brought on-line in both the steel and titanium industries.

Demand for aerospace metals will remain strong through 2010. To insure adequate on-hand inventory for sustained production operations, the customer and provider must plan together. Mill runs and forecasted demand of each material must be considered when planning the required inventory. Major aerospace companies are doing this successfully and have been able to work through cyclical fluctuations in supply and cost. DoD production operations need to adopt these practices to maintain materiel readiness levels.

The assessment helped the Air Logistics Centers develop materials inventory management and sourcing strategies to minimize production impacts due to fluctuations in supply that affect metal costs and lead-times. Solutions have included the increased use of Fixed Price Economic Price Adjustment Contracts and the use of distributor services models for rapid material deliveries.

Space Solar Cell Business & Technical Report (June 2006)

The overall decline in the space market has had a negative impact on suppliers of niche components and technologies. Often there are only one or two qualified sources, and frequently one, if not both, are finding it difficult to justify the business case to continue production. Limited DoD participation in the lower tiers of the supply chain combined with uncertain sales forecasts has resulted in an overall reduction in investment in both next generation products and manufacturing infrastructure. The report, generated by Air Force Space Command, assessed present-, near-, and far-term domestic capabilities to manufacture space solar cells and examined market factors that could place these capabilities at risk. The assessment focused on solar cells intended for space applications only, and did not investigate terrestrial-application solar cells.

The domestic space solar cell industrial base consists of two manufacturers. Each company manufactures a space solar cell with a Beginning of Life (BOL) energy efficiency of approximately 28 percent. Both companies have demonstrated a 30 percent BOL efficiency space solar cell in a laboratory setting, but have not yet developed a repeatable manufacturing capability for this technology. The Government is investing in technology to increase cell energy efficiencies to 33 percent BOL and eventually beyond 40 percent.

The space-based solar cell industry is a niche market that has experienced declining demand due to inconsistent markets for both commercial and military satellites. Both manufacturers represent a small percentage of sales of a larger corporate entity. As such they are at risk from both poor performance of the parent company or lack of profitability of the photovoltaic product line. In addition, foreign competition and export control limitations prevent significant increases in market share.

Solar cells typically are the largest single cost component of a satellite and as such represent an opportunity for significant cost reductions if the energy efficiency and the manufacturing yield can be increased. At present time, an Air Force ManTech program that focuses on improving the producibility of the 30 percent space solar cell with both U.S. industry partners is viewed as an optimal program approach.

This assessment is supporting multiple activities within the Air Force Space community including investment planning within AFRL, acquisition strategy planning at Space and Missile Systems Center and policy development.

AFMC Reverse Engineering Assessment (August 2006)

Reverse Engineering is applied when manufacturing and maintenance operations are unable to procure or reproduce a part due to a lack of engineering data, drawings, tooling, and/or material sources. This assessment reviewed the state-of-the-art of current processes, tools and technologies associated with reverse engineering aircraft structural and mechanical components. The report assessed commercial

vendors that provide specialized reverse engineering tools and services to Air Force material support organizations. The goal of the study was to identify the new capabilities that could be adopted and piloted within the Air Force to reduce the costs and lead-times associated with re-creating technical data to facilitate both procurement and in-house manufacturing/maintenance operations.

Air Force maintenance facilities use equipment and software that are comparable to the current state-of-the-art used throughout commercial industry. Most of the equipment and software in use is acquired from commercial sources. The industry is diverse and includes both domestic and foreign instrument manufacturers, software development firms and engineering services companies. Key product technologies include: digitizing & scanning, coordinate measurement, 3D Computer Aided Design solid modeling, and rapid prototype manufacturing. There is significant competition within the various specialty areas and much of the technology overlaps tools and techniques for new product design and manufacturing.

Shortfalls exist with current tools, techniques, and technologies used for legacy systems reverse engineering. Geometry capture devices and software need expanded capability for non-contact measurement of large structures and parts with complex internal surfaces. The tools that generate parametric models from point clouds need to be automated. Even with the most current tools and experienced engineers, reverse engineering results in significant non-recurring costs and rarely recoups those costs through potential competitive procurements. Reverse Engineering is at best a last resort that supports those situations where neither the original manufacturer nor the Government have maintained product or tooling data.

The assessment is helping the Air Force Materiel Command develop technology investment and sourcing strategies that assure the availability of parts to improve weapons system availability and drive down supply chain costs and cycle times. Recommendations included both process changes and pilots targeted at validating concepts that would have broad application across the Command.

Ethylene Vinyl Acetate Encapsulant for Photovoltaics Industrial Base Assessment (September 2006)

Photovoltaic (PV) cell assemblies are encapsulated into watertight modules for protection from moisture and impacts. The resulting assembly is a PV panel consisting of the glass glazing, silicon wafers and associated wiring, a protective back sheet, and encapsulant. The most common type of encapsulating material used in the photovoltaic industry is Ethylene Vinyl Acetate (EVA). The goal of the study was to identify the need to create/develop/expand domestic EVA based encapsulant production capability to support the photovoltaics industry. The study assessed current technology trends, production capability, and market factors.

There are two domestic and three foreign companies manufacturing EVA encapsulants for the PV industry. Both domestic companies are financially healthy. Several other companies manufacture EVA encapsulants, but their encapsulant material has not been qualified for use in PV applications. These companies represent potential sources of supply for EVA encapsulant material for PV panels. As an alternative to EVA, silicon also can be used as an encapsulant. In the past, silicon has been more expensive, but costs have decreased so the material now is competitive.

Market forecasts predict photovoltaic sales will triple by 2012. The current production base for encapsulant material is dynamic with both multiple manufacturers and a variety of material selections. Given the options available for photovoltaic cell manufacturers, encapsulant production capacity should not be a limiting factor to market growth.

This assessment is supporting multiple activities within the Air Force space community including investment planning within Air Force Research Laboratory, acquisition strategy planning at Space and Missile Systems Center and policy development.

Methanol Fuel Cell Component Industry Analysis (September 2006)

A fuel cell is a device that converts the chemical energy of a fuel (hydrogen, natural gas, methanol, gasoline, etc.) and an oxidant to produce electricity with water and heat as by-products. Fuel cells of all types will help the military reduce the cost of battlefield logistics. Direct Methanol Fuel Cells (DMFCs) will be able to provide up to ten times the power duration found in current batteries. The goal of the study was to identify the need to create/develop/expand domestic production capability for selected methanol fuel cell components. Of primary interest is the manufacture of the Membrane Electrode Assembly (MEA). The study assessed current MEA technology trends, production capability, and market factors.

Five North American companies manufacture MEAs for fuel cells. Several technologies are employed with some being more mature than others. First generation MEAs utilize a Nafion[™] membrane that incorporates rare and expensive platinum/ruthenium as a catalyst. This technology is subject to methanol crossover/poisoning. All of the domestic companies are pursuing alternative technologies. Some of the solutions include using a hydrocarbon-based membrane, carbon nanotubes, or a low precious metals product called Dynalyst[®] as a catalyst. All of the alternative technologies are in development and require maturation of the overall fuel cell market for the business case to warrant a significant investment in production capacity.

In general, DMFC technology and the wider fuel cell industry are still in the early developmental stages. A variety of approaches to develop technology solutions are being pursued globally with significant investment by both Government and the

commercial sector. Growth in the fuel cell market lags predictions made only a few years ago. Therefore, current forecasts have become more conservative in estimating a technology that will not see wide-scale commercialization for at least another five years.

This assessment is supporting investment planning within the Air Force and broader DoD research and development communities.

Composite Fiber Placement Equipment Industry Assessment (October 2006)

While end items such as aircraft and missiles are often the focus of DoD analyses and planning, the industry that designs and produces advanced manufacturing equipment to fabricate metallic and nonmetallic components is often overlooked even though it provides the capability to create affordable and producible high performance structures. Basic composite lamination processes are: filament winding, in which a band of narrow fiber bundles called "tows" is wound around a mandrel; tape laying, in which a relatively wide band of fiber "tape" is either laid over a mold, or placed on a flat surface to produce a sheet; and fiber placement, in which a band of tows is placed over a mold. This assessment identified and evaluated current manufacturers of fiber placement head equipment and reviewed capabilities at commercial and government aerospace composite fabrication centers for large/complex structures. The study assessed current technology trends, production capability, and market factors.

There are five domestic and three foreign major fiber placement machine manufacturers. Of the five domestic firms, two were rated a low financial risk while the other three were medium to high risk. Foreign sales of composite manufacturing equipment are subject to various export restrictions due to their use in critical military applications. This makes market growth a slow and often difficult process. To assess current and future requirements for fiber placement equipment, the capability and workloads at twelve company-owned and five government composite fabrication centers were evaluated. These aerospace composite "Centers of Excellence" maintain significant production capacity, as well as, provide resources to pilot and validate new equipment and product technologies. The Centers work closely with equipment manufacturers to design and develop machines for special applications.

There is a need for additional composites automation and more affordable machines to support the aerospace composite industry. Automated tape laying and fiber placement machines offer lamination technologies that could be adapted to a wide range of part geometries and sizes. Broader application of composite materials to new commercial and military products will provide an incentive to increase corporate capital investments. Government investments should focus on unique and critical military applications where a limited commercial business case exists.

This assessment is supporting investment planning within the Air Force and broader DoD research and development communities.

Silicon Carbide Industry Assessment (December 2006)

Silicon Carbide (SiC) fiber use in military and civilian applications is growing. SiC fibers are used in Ceramic Matrix Composites (CMC) to produce both engine and aircraft components that offer distinct advantages over current metallic materials, including light weight, ability to withstand high temperatures, and a low dielectric which can aid in reducing the radar signature of modern military aircraft thereby enhancing the weapon system's survivability.

Four domestic and two foreign (both Japanese) companies manufacture SiC fiber. All of the domestic firms are small, privately-owned, manufacturers (one has major corporate funding) with specialized research capability and limited production capacity. Financially, none of the companies profiled represent a high financial risk. Most received a moderate financial rating indicating the companies are not experiencing serious financial concerns.

The F-35's Common Exhaust Nozzle employs SiC fiber CMC components to make up the exhaust nozzle's primary and secondary flaps and seals which results in a lightweight exhaust nozzle. The SiC material used on the F-35 is produced by a Japanese manufacturer. Other companies produce SiC fiber materials similar to the material used on the F-35, but there are no plans to qualify a second source. Several constraints regarding the current source of SiC have been identified by component manufacturers using the Japanese supplier, including: demand in excess of capacity; export controls levied by the Japanese government; and inconsistent product quality. These constraints have resulted in delays in fabricating components made from the SiC material.

This assessment is supporting investment planning within the Air Force and broader DoD research and development communities.

4.5 Defense Contract Management Agency (DCMA)

National Polar-orbiting Operational Environmental Satellite System Key Sensor Assessment (April 2006)

DCMA IAC conducted this review in support of an April 2006 National Polar-orbiting Operational Environmental Satellite System (NPOESS) Defense Acquisition Board (DAB) review. DCMA conducted an industrial, technological, and financial assessment of potential risks within the prime and subcontractor base of the two key sensors for the NPOESS weather satellite program; Visible Infrared Imaging Radiometer Suite (VIIRS) and Conical Scanning Microwave/Imager Sounder (CMIS). Those two sensors eventually will be flown on various alternative programs that are currently being considered, that meet warfighter requirements.

The assessment concluded that the NPOESS program office will face multiple supplier risks with the two sensors in the future. The assessment provided the details needed to assist the Nunn-McCurdy management IPT with a solid plan to mitigate the sensor supplier risks.

Industry Surge Capability Analysis (July 2006)

DCMA IAC has a Memorandum of Agreement with the Joint Staff (J-4) to analyze industry's capacity and capability to surge for 45 munitions programs, Joint Service Lightweight Integrated Suit Technology (JSLIST) Chemical Protective Suit, Interceptor Body Armor System, and Unmanned Aerial Vehicles (UAV). DCMA has provided annual updates to J-4, ODUSD(IP) and the military services for over six years. The study includes prime and critical subcontractor production capabilities, manufacturing capacity and lead times, current and surge production rates with limiting factors, vertical, and horizontal, market, business base and predictive analysis.

The munitions industry is dependent on the level of DoD investment and is currently healthy. Recent history indicates accelerated production of certain munitions may be required to successfully prosecute future conflicts. Bottlenecks in the supplier base remain limited and excess production capacities are available to support production acceleration of key components. While there is reserve capacity available for certain critical components, the time required to accelerate production to maximum facilitated rates can exceed 12 months.

DoD UAV funding slightly declined in FY06. There are currently four primary domestic contractors building UAVs supporting DoD. Boeing's Unmanned Combat Aerial Vehicle and Honeywell's Future Combat Systems Micro-UAV plan on entering market. The assessment found that competition exists at all levels within the UAV industry but consolidations are taking place.

The JSLIST over garment is a two-piece jacket and trouser with the pivotal industrial base issue being the availability of activated carbon beads from a foreign source used in the production of the laminated fabric. There are no requirements for the JSLIST beyond FY08 and the Joint Program Manager for Individual Protection is considering several new technologies for future systems.

M291 Skin Decontamination Kit and Reactive Skin Decontamination Lotion Contractor Capabilities Assessment (July 2006)

In support of the DCMA Memorandum of Agreement with Joint Program Executive Office for Chemical and Biological Defense (JPEO-CBD), the Joint Service Family of Decontamination Systems Project Office (JSPDS) requested DCMA to perform an industrial capability assessment of three key decontamination contractors and one organic DoD decontamination facility. The JSPDS is currently preparing for an Increment I Milestone "C" decision. One key element is a business case analysis to support the evaluation to either continue production of the currently fielded M291 Skin Decontamination Kit (M291 SDK) or begin full rate production of Reactive Skin Decontaminant Lotion (RSDL).

The study concluded that exclusive award of RSDL will shrink the supplier base for the M291 SDK because the Department of Defense is the major buyer of the product. The sole award of RSDL or M291 SDK will not have any long-term adverse impact on the sector, future capabilities, and manufacturing capacity on either product or the CBD industrial base. The exclusive award of RSDL will have a significant adverse impact on one prime M291 SDK producer since it is 100 percent government dependent and may exit the business. The two remaining contractors for M291 SDK and RSDL will continue to market their propriety products and their next generation decontamination solutions to the Department. All contractors are zealous about the Decontamination Program and have/are willing to devote dedicated revenue, equipment, research and development, and surge capability to support the Personal Skin decontamination program.

Production Capability and Capacity Assessment Hydrogenics Corporation (August 2006)

The objective of Phase I of the North American Technology and Industrial Base Organization (NATIBO) Fuel Cell Study was to perform a production capability review of Hydrogenics to supply Proton Exchange Membrane (PEM) fuel cells to support future military silent watch requirements. The key issue addressed was Hydrogenics' current and future production capability, capacity and scalability to support future military requirements. Specifically, this study concentrated on a family of Fuel Cells meeting the technical requirements for domestic and Canadian Defense Programs such as Program Executive Office (PEO) Stryker for LAV III and Coyote. Key issues were industrial base

production capacity and sourcing. In addition, dual-use application for these Fuel Cells was identified so that the full production risks and impact could be determined.

DCMA IAC provided NATIBO a report that included industrial and financial analysis of Hydrogenics and concluded that the Steering Committee request DCMA IAC to commence work on Phase II of the Fuel Cell Study to identify and assess additional North American Fuel Cell Suppliers manufacturers and distributors. ODUSD (AS&C) Office of Technology Transition will seek the military services, other DoD components, and industry endorsement and sponsorship for this Phase of study.

Interceptor Body Armor System (September 2006)

Because of increased requirements for personal protective equipment, DCMA performed an industrial capability assessment of Interceptor Body Armor (IBA) System manufacturing capabilities in support of the Priority Allocation of Industrial Resources (PAIR) task force. The PAIR task force used this assessment to inform the allocation of industrial resources to meet DoD demand for the IBA.

DCMA concluded that the industrial capabilities required to design and manufacture IBA systems are a low risk. There is adequate production capability throughout industry (both ceramic plate manufacturers and backing material manufacturers) to meet DoD demands. Manufacturers increased production to meet DoD demands since the beginning of operations in 2001. Consequently, the IBA industrial base has expanded to at least 24 companies in the United States, and two foreign companies. In the past three years, the capacity of industry to manufacture body armor protective inserts has increased from hundreds of inserts per month to approximately 100,000 inserts per month. Honeywell and DSM Dyneema have increased their backing material capacity enough to meet both their DoD and commercial orders.

Liquid Rocket Engines (September 2006)

Based on concerns associated with conclusions from the Space Launch Vehicles System report that was completed in October 2005, the DUSD(IP) asked the DCMA IAC to assess the impact of the downturn in space launch vehicle requirements on the liquid rocket engine sector.

The assessment found that liquid rocket engines (LRE) account for a very small portion of the prime contractors' corporate business base and as well as a very small portion of the overall launch cost. The workload for LREs is exclusively for launch vehicles and the space shuttle. The prime contractors are in some cases subcontractors for their own programs. Many of the subcontractors are small privately owned firms. LREs account for less than one percent to approximately 30 percent of the subcontractor's business base. Many of the lower tier suppliers that are producing

LRE components also produce components for jet and gas turbine engines. There are two prime LRE contractors (Gencorp Aerojet and United Technologies Pratt & Whitney). However, only United Technologies Pratt & Whitney now is producing LREs. Additionally, Gencorp Aerojet is decontaminating and dismantling its hot fire test stands. A current LRE technology initiative is focused on developing a Liquid Oxygen/Liquid Methane rocket engine that is projected to reduce the costs of fueling and servicing operations. But development is still years away. The assessment found a potential concern with the RS-68 liquid rocket engine program used on the Delta IV launch vehicle and a modified version planned to be utilized for the liquid propulsion on NASA's future space vehicles. Production of the Delta IV RS-68 LRE is projected to be completed in 2007/2008 with production of the modified version for NASA's future space vehicles which could result in a five year production break. The break would not cause any of the subcontractors to cease operations but could result in higher production and requalification cost if a current subcontractor cannot support future production schedule requirements. The assessment included recommendations for potential mitigating actions such as maintaining RS-68 production at minimum sustaining rates, starting EELV Buy 4 production early, or executing a lifetime buy.

Domestic Automotive Economic and Industrial Capability Assessment (October 2006)

This DCMA IAC conducted this assessment to evaluate the Domestic Automotive Industry restructuring and supplier base and determine any impacts on DoD ground systems applications.

The domestic automotive industry is restructuring and recalibrating its operations to meet increasingly competitive market conditions. The restructuring involves a significant reduction of excess capacity, and eventually a reduction in the subtier supplier base. Furthermore, studies by numerous auto consulting firms have concluded that no less than 40 percent of the North American suppliers are in "fiscal danger." The Department of Defense is not a major driver of the domestic automotive market. The study is comprised of an economic analysis and an industrial capability assessment that gauged the operational health of current and future defense contractors and suppliers. The study assessed the domestic automotive industry trends and health, automotive subtier suppliers vital to DoD ground systems procurement, connectivity implications of suppliers that service both commercial and military markets, and domestic heavy truck technology projects that can be applied to future DoD ground systems vehicles. DoD ground systems are connected primarily to the Heavy Truck, Off-Highway and Heavy Machinery Industry which is not experiencing financial challenges to the same degree as the domestic automotive industry. There is, however, some degree of connectivity identified with the Domestic Big Three Automakers at the key subcontractor level in the areas of axles, drive train components, cooling systems, and steering. The assessment predicts that global sourcing for commercial and military parts will increase; however the domestic industrial capabilities to support DoD ground systems are available and are projected to remain in place. Most suppliers were assigned a low industrial risk.

Propulsion Shafting Study (November 2006)

The Office of the Deputy Under Secretary of Defense Industrial Policy asked the DCMA IAC to assess the manufacturing capability and capacity of the domestic industrial base producing and repairing propulsion shafting. This segment of the industrial base supports Navy shipbuilding and repair programs, and is divided into several distinct areas where unique capabilities are required. These capabilities include melting, forging and heat treatment, finish boring, and finish machining. Defense Federal Acquisition Regulation Supplement (DFARS) restrictions require the Department acquire ship propulsion shaft forgings only from U.S. suppliers.

The assessment concluded that if the domestic source restriction for propulsion shafting is removed, a major portion of the industry might be jeopardized. The industry provides key production and readiness capabilities to the U.S. Navy. The loss of military contracts to foreign sources could result in the closure of critical facilities. Additionally, it could affect the ability to procure quality products at any cost due to the loss of skilled, experienced workers. The study recommends maintaining the restrictions to preserve domestic capabilities to manufacture and repair Navy propulsion shafting.

Material Producer Study Summary (November 2006)

In the wake of rising commodity demand and prices over the past five years, the Office of the Deputy Under Secretary of Defense Industrial Policy asked DCMA IAC to assess the performance of key material producers. The objective of the study was to determine if increasing metal prices is impacting the companies that produce metals and primary metal products. The study included 44 mining companies and 66 refining companies with 32 companies engaged in both operations. The companies included are large publicly traded companies in the various metal producing industries from both domestic and foreign sources. Foreign companies include leading global producers and companies with significant operations in the United States.

More than half the companies were rated low financial risk indicating that most companies in the material producing industries are financially healthy. There was little difference between the overall risk ratings of domestic and foreign companies in the study. In addition to the financial assessments of the material producers, the IAC performed economic assessments on four sites (subsidiaries of selected companies) identified as providing important metals supporting defense. All four sites were rated moderate risk from an economic viability perspective. A major finding of the study is that material producing industries are consolidating in response to market pressures for rationalization, and to develop new sources of supply. The study recommended the Department continue to monitor material industries to ensure stability of supply to defense markets. The Department also would benefit from a better understanding of

the application of critical raw materials to weapons systems. Such information would mitigate disruption in the supply chain and the potential impact to defense weapon systems.

Helicopter Subcontractor Sourcing Assessment (December 2006)

The purpose of the study was to determine the degree of foreign outsourcing of selected subsystems for the V-22 Tilt-Rotor, UH-60 Blackhawk, UH/AH-1 and AH-64 Apache Helicopter programs. Information researched and assessed included identification of key domestic and foreign suppliers supporting the helicopter industrial base, core capability determinations and Berry Amendment-compliant (Specialty Metals) suppliers supporting helicopter manufacture.

Research indicated that there are adequate domestic suppliers for the four programs for each of the selected subsystems; core capabilities retained by the prime integrators are unique to each company; and Berry Amendment suppliers/issues are minimal. Foreign dependency is not an issue. Prime Integrators have implemented programs/processes to ensure lower tier suppliers comply with Berry Amendment requirements.

4.6 Defense Logistics Agency (DLA)

UH-60 Helicopter Windshields Update (May 2006)

In FY05, DLA funded a Warstopper investment of \$1.85M at PPG Aerospace to add Government Furnished Equipment to improve support to contingency missions. During Operation Iraqi Freedom, the demand for UH-60 windshields of 100 sets (200 each) per month exceeded PPG's capacity. This capacity constraint caused serious backorder problems. To remedy this situation, DLA funded an additional Nesatron windshield coating vacuum chamber for PPG.

The new Nesatron Chamber was installed in March 2006; production startup began May 9, 2006. PPG's production was limited to 60 sets (120 each) per month prior to the installation of the new Government Furnished Nesatron Chamber. As a result of DLA's investment, PPG can now produce 100 sets (200 each) per month. If capacity is borrowed from the commercial chambers (as has been done during past contingencies) an additional 40 sets (80 each) can be produced, achieving a total capacity of 140 sets (280 each) and exceeding DLA's original goal of 120 sets (240 each) per month.

Lithium Batteries BA 5390/5590 Update (August 2006)

DLA continues to monitor the implementation of its FY04/ FY05 \$13M Lithium Battery (BA 5390/5590) Industrial base improvement program. The three manufacturers (Saft, UltraLife and Eagle Picher) are scheduled to complete their upgrades by mid-year FY07. These investments are intended to decrease ramp-up time by 50 percent and improve vendor surge ability by 121 percent in the first 90 days of a contingency. DLA will conduct a Value Stream Analysis review, to validate/document the gains achieved and seek additional improvement opportunities.

Defense Wall, Rapid (Hesco Bastion) (October 2006)

DLA updated an analysis as part of its industrial capability assessment on the rapid deployment force protection barriers, or bastions, sole-sourced to Hesco in the United Kingdom. The assessment focused on mitigating DLA's risk in meeting wartime demand for these unique barricades and indicated that pre-positioning of critical raw materials was needed to reduce the lead-time for the geo-textile and steel components. The analysis determined the least cost/best value alternative to resolve known gaps between wartime requirements and current industrial capability.

DLA funded a FY06 investment for a second year commitment through the Warstopper Program to pre-position raw materials to allow HESCO to begin immediate ramp-up during wartime production. HESCO has secured the non-woven geo-textile liner (subject to Berry Amendment restrictions as provided in the Title 10 U.S.C. 2533b),

the most critical material needed in regards to lead-time, from its U.S.-based textile source, SI Geosolutions from Chattanooga, Tennessee. With the completion of second-year funding, HESCO will complete the pre-positioning of all materials by adding steel components to meet the surge and sustainment requirements under the current contract. The Agency is currently working on the follow-on contract and transfer of all surge materials and coverage to a new agreement.

Enhanced Small Arms Protective Insert (October 2006)

There are currently two ballistic fabrics (unidirectional polyethylene material) which are used in the manufacture of Enhanced Small Arms Protective Inserts (ESAPI)—SpectraShield (manufactured by Honeywell) and Dyneema (manufactured by Dutch State Mines (DSM)). DSM has increased output of Dyneema at their U.S. manufacturing facility in Greenville, North Carolina. With this additional output, there is now enough unidirectional polyethylene material available to satisfy DoD requirements in support of the ESAPI program. The material previously has been allocated by the Department of Commerce and Department of Defense under the authority of the Defense Priorities and Allocations System (DPAS).

Extreme Cold Weather Clothing System (October 2006)

The Generation (Gen) I Extreme Cold Weather Clothing System (ECWCS) is being phased out. The Army has requested that Defense Supply Center Philadelphia (DSCP) procure Generation II ECWCS in the Universal Camouflage Pattern. The Generation II will be the primary ECWCS outerwear until the full implementation of the Generation III system, which will not be introduced in a widespread manner until FY08 at the earliest. The plan is the Generation II parka and trousers will continue to be used after introduction of Generation III and will serve as an additional layer to the Generation III system. Materials will be readily available in the marketplace with a six-month production lead-time. Some Army demands along with Air Force ones will continue to be satisfied by the Woodland and Desert Generation I as troops continue to draw down residual assets of those items. There are currently four contractors producing the ECWCS parka and trousers. In order to support the customer's requirements, these existing contracts were converted from the Gen I to the Gen II ECWCS enabling continued support to the troops and stopping the shut down of three commercial vendor lines. Shipments began August 2006 and demand for these items has been robust. Some of the contractors have been able to accelerate their schedules to help keep up with the demand. There is no immediate industrial base problem with ECWCS. However, continued coordination with the Army as the transition to the Gen II and Gen III systems is a necessity to secure the future needs of the warfighter.

Industrial Base Extension Follow-on (October 2006)

A Commercial Asset Visibility (CAV) initiative provides Outside the Continental United States (OCONUS) visibility and access to global assets. The Industrial Base extension (IBex) program is a partnership with multiple global logistics providers to develop an overlapping global network of information on manufacturing, logistics, storage and transportation OCONUS. The IBex program was primarily created to obtain worldwide commercial logistics capability assessments from global logistics providers. For the expenditure of \$200K per year, the government gains access to, and a better understanding of the global logistics networks and issues related to cultures, customs requirements and documentation, host nation knowledge, global constraints and logistical nuances unique to any particular country or culture in areas of the world with limited U.S. resources.

The IBex program, which includes the Subsistence OCONUS Prime Vendors and other global logistics providers, improves Defense Supply Center Philadelphia (DSCP)'s readiness posture by having private businesses provide the technical expertise and fundamental understanding of remote geographic locations to improve military readiness in a surge situation. IBex enables DSCP to reduce the overall costs and time involved in planning and maintaining visibility over logistical assets. IBex provides a flexible, efficient and commercial approach to support the Combatant Commanders, the DSCP Europe and DSCP Pacific planning mission, U.S. Military Planners and other government agency planners to identify new and innovative concepts and solutions to logistical problems. IBex information and reports continue to support military planning missions overseas. Information obtained through the IBex program has supported U.S. Army Europe and U.S. Special Operations Command (USSOCOM) to determine base camp construction, available aircraft capabilities and sourcing for Cormex type living containers. Geographic capability assessments on countries within West Africa were specifically requested. The information submitted via IBex has provided a very high level of confidence within USSOCOM that their potential needs can be met. These military customers now have a much better understanding of the global capabilities available. The IBex program is also capable of supporting disaster relief efforts and continues to support the military services' ability to accomplish its mission in Southwest Asia and the overall Global War on Terror.

Nerve Agent Antidote Auto-injectors (October 2006)

The Industrial Base Maintenance Contract (IBMC) is a fee for service we pay Meridian Medical Technologies (MMT) to maintain a warm base in order to increase—overnight—production capacity to satisfy the Services wartime requirements for Nerve Agent Antidote Auto-injectors (NAAA). Normal peacetime production is 200,000 auto-injectors per month or 946,000 in 142 days. Wartime support requires 5,000,000 auto-injectors in the same five-month period. Neither MMT, nor any for-profit business, will maintain idle excess plant capacity of 526 percent on the chance that the Department may buy additional NAAA product to go to war. The IBMC pays MMT to maintain this excess plant capacity and to rotate components for auto-injectors that DSCP has purchased and stored at MMT for use in contingencies. The NAAA IBMC investment for FY06 was \$10.1M.

Joint Services Lightweight Integrated Suit Technology Ensemble (October 2006)

During all of FY06, Joint Services Lightweight Integrated Suit Technology (JSLIST) production was sustained at 128,000 suits per month. The need for this rate of production was due to the increased demands since Operation Enduring Freedom (OEF) and Operation Iraqi Freedom (OIF) for this chemical and biological suit and in order to reduce the backorders that resulted from this demand. Four contractors produced JSLIST during FY06. However, due to decreased backorders and reduced demands, starting in October of 2006 and continuing throughout FY07, the Department will utilize only two manufacturers for these items. There is currently only one manufacturer for the liner fabric; numerous attempts to qualify additional sources of fabric have failed. In January 2004, Bluecher developed their own beads in their manufacturing plant in Germany and presented it in conjunction with on-going JSLIST Additional Source Qualification (JASQ) program testing. Planned production in FY08 will start at 80,000 suits per month and will continue for approximately six months, and then gradually ramp down to meet the current demand while allowing for a four month on-hand inventory. Today, there are two types of liner fabric qualified, and they are both manufactured by Bluecher.

The JSLIST Joint Program Office (JPO) has changed their requirement for the number of suits needed to meet wartime scenarios. Current scenarios require approximately four million JSLIST suits. This significantly changed the number of suits required by the JPO and limited the funds for procuring additional suits. However, the Services will continue to use their own funds to procure JSLIST suits. Currently DLA has backorder quantities of approximately 22,295 suits and an average monthly demand of 50,000 suits. Once all backorders have been filled, which is projected for mid FY07, DLA plans to ramp down the existing contractors to a quantity that covers the average monthly demand and allows an inventory. Planned production in FY08 will start at 80,000 suits per month and will continue for approximately six months, and then gradually to meet the current demand while allowing for a four month on-hand inventory. These production quantities are less than the current availability of fabric. Bluecher, the

material manufacturer, is capable of making enough fabric to manufacture 128,000 suits per month.

Meals Ready to Eat (October 2006)

Significant requirements for the Meals Ready to Eat (MRE) combat ration program continued for operations in Afghanistan and Iraq. Additionally, requirements received from the Federal Emergency Management Agency (FEMA) to prepare for and respond to disasters within the United States totaled 250 thousand cases of MREs. The current commercial industrial base has been more than capable of handling the surge in requirements.

The approved five million case War Reserve level of MREs has been reached, however the peacetime rotation and increased handling charges are still of concern. There are other state and local agencies that would like DLA support but are currently not authorized to purchase rations from DLA. This is an area that needs further review under section 803 (Anti-Terrorism and Homeland Security).

Nuclear Biological Chemical Defense Program (October 2006)

The Industrial Base Maintenance Contract (IBMC) described earlier satisfies only 61 percent of the total requirement. Two initiatives funded with Warstopper funds provide additional capability to ensure the Services are able to obtain 100 percent of the total auto-injector requirement:

The Nerve Agent Antidote Auto-injectors (NAAA) Service Life Extension Program (SLEP) provides funding for management and remarking of the Services' NAAA stored at Meridian Medical Technologies (MMT) that are at or beyond their initial expiration date, yet remain potent. All auto-injectors in SLEP can be reallocated by Defense Supply Center Philadelphia (DSCP) to satisfy Service surge requirements. The NAAA SLEP investment for FY06 was \$1.5M.

The NAAA Readiness Enhancement Program (REP) initiative provides funding to recruit, test, hire, train, and retain a pool of twenty-five personnel to staff on 24-hours notice the second shift at the MMT production facility in St. Louis, MO. The second shift is needed to quickly increase production to support contingencies. For example, during OEF in October 2001, the second shift at MMT assembled 150,000 MK1s for the Army. Additionally, during the period from October 2002 to present, the second shift has been employed almost full-time satisfying the Services' short notice requirements. The NAAA REP investment for FY06 was \$102K.

Petroleum, Oil, and Lubricants (October 2006)

As discussed in Section 3.1 of the February 2006 *Annual Industrial Capabilities Report to Congress*, the commercial satellite market has experienced a downturn in recent years. In addition, the Department has reduced its procurement of satellites. Regardless, the Department continues to have a guaranteed supply of the two liquid propellants critical to the US space program, hydrazine and dinitrogen tetroxide, although a limited domestic industrial base exists for both commodities. Assured delivery of all of DoD requirements for both products exists as a result of the acquisition strategies employed in the award of contracts to both sources. Specifically, the DLA Defense Energy Support Center has utilized a pricing structure that guarantees reimbursement to both contractors of all fixed costs incurred at their respective production facilities. Variable costs are then reimbursed in the price of product as orders are placed. Both contracts were awarded with adequate price competition, ensuring that prices paid under both contracts are fair and reasonable.

The Defense Energy Support Center is researching the use of the Fisher-Tropsch technology. This technology would allow the United States to convert a portion of its abundant coal reserves into liquid fuels. DESC surveyed companies on the possibility of providing 100 million gallons of JP-8 to the Air Force and 100 million gallons of JP-5 to the Navy. Of 28 companies surveyed, 22 intended to manufacture synthetic fuel. Twenty proposed using the Fisher-Tropsch Coal-to-Liquid process; 18 of those would use domestic coal.

Risk mitigation is the primary hindrance to further progress. If this issue can be resolved, synthetic jet fuel production could fulfill more than half of the Department's current domestic consumption of jet fuel by 2016.

Pharmaceutical, Medical/Surgical, Medical Equipment (October 2006)

Defense Supply Center Philadelphia (DSCP) has contingency contracts in place that guarantee immediate availability of up to \$303M worth of sustainment materiel. This coverage increases to a total of \$594M, over a six-month period, if all "refresh" options are exercised.

Prior to the 1990s, DLA stored a vast amount of medical materiel in military depots just in case it was needed for contingencies. This process was costly and, as we discovered during the first Gulf War, neither efficient nor effective. Beginning in the mid-1990s, DLA adopted a new approach to ensure the Services have medical materiel for surge and sustainment. Only military unique medical items are maintained in depots. For the balance of the medical requirement, DSCP relies on the industrial base. DSCP pays manufacturers and distributors in peacetime a fee to increase their safety stock of critical materiel. DSCP is then guaranteed immediate coverage from industry for critical medical materiel during contingencies. The safety stock remains with the manufacturers and distributors who rotate the materiel and keep it fresh. It is made

available to the Services upon request. DLA no longer maintains non-military unique medical materiel in depots; instead, it writes and manages contracts which provide guaranteed access to critical materiel to meet the Services' timed-phased deployment requirements.

An independent contractor, Logistics Management Institute (LMI), studied operations in Afghanistan and Iraq to assess DLA's ability to provide medical materiel during contingency operations. LMI reported that (1) DLA's contingency contracts are fundamental to readiness; (2) the industrial base is able to support the Department's medical contingency requirements for medical materiel; and (3) commercial contingency materiel is not used to its fullest potential, i.e., additional materiel is available to place under contract, if funding were available.

DLA established a Medical Contingency File (MCF) database that consolidates and aggregates the time-phased wartime requirements from all Services. The Services submit requirements to the MCF on a semi-annual basis. The MCF is the principal management tool used by the Services, DSCP, and the Defense Medical Standardization Board to identify and manage medical contingency materiel requirements. It is maintained by DSCP. Once the requirements are known, DSCP works to obtain commercial contract coverage for contingency materiel requirements in time to meet the response times and levels defined by the Services. The commercial coverage of \$594M represents the amount of the total requirement identified in the most recent MCF update that is owned or under contract for the specific purpose of initial outfitting or resupply upon deployment. Progress in overcoming the readiness shortfalls is measured by the number of MCF items covered under contingency contracts. As of 30 September 2006, DLA had coverage on 6,529 of the 13,603 items in the MCF. Therefore, DLA has some coverage on about 48 percent of the required items. This is a significant increase from the 30 percent level during 2001. DLA identified funding requirements in its Program Objective Memorandum (POM) submission that would enable it to achieve 85 percent coverage of the total \$1.1B wartime requirement by FY10. Although this funding was not approved, DLA will resubmit this request during the next POM cycle. To support the Services' war requirements, DLA invested approximately \$33.5M of FY06 funds for medical contingency contracts necessary to meet MCF requirements. As noted above, this \$33.5M bought us guaranteed immediate availability of up to \$303M worth of sustainment materiel. This coverage increases to a total of \$594M, over a six-month period, if all "refresh" options are exercised.

Rapid Assembly Program Follow-on (October 2006)

The Rapid Assembly Program (RAP) allows for increased Surge capability for Unitized Group Rations (UGRs). It features flexible unitization capability via self-contained mobile production line assembly modules capable of being deployed to government depots, commercial ration assemblers, or through the subsistence Prime Vendors program. Their use will significantly shorten lead-times of finished UGRs to

theater by obviating the need to assemble and transport completed rations from the United States. The implementation of this program will also free up critical transportation assets. Two additional assembly modules were purchased (\$450K) during FY06 to further offset the shortfall for UGRs. These units will be specially configured for OCONUS use, and will include voltage converters and air compressors.

Sand Bags (October 2006)

DLA performed an assessment on the sandbags made of polypropylene, acrylic, and cotton duck. The sandbags must meet Berry Amendment requirements. Current and anticipated demands for these items during major military operations (like OEF/OIF), contingency support, and/or humanitarian relief operations indicate a surge in orders that may exceed current maximum production capabilities. DLA traditionally obtains sandbags through Historically Underutilized Business (HUB) Zone certified sources.

Contractor capabilities for the acrylic and cotton duck bags are deemed adequate to meet OEF/OIF demand. Long term contracts are in place to support the acrylic bags. Surge demand is mainly for the polypropylene bags. Current stock and contract capabilities are adequate and well above the current demand. The War Reserve Program may be more applicable to these items.

Tents and Shelter Systems (October 2006)

DLA completed an industrial capability assessment for military specification tent and shelter systems in March 2006 to assist in determining long-term procurement objectives to support the industrial base. Recommendations from the study are being pursued including: completing a Minimum Sustaining Rate (MSR) study to define funding levels needed to award MSR contracts to build War Reserve Materiel (WRM) inventories and sustain a tent and shelter industry capable of responding to wartime requirements; industrial base investments through the Warstopper Program are being studied to support improved vendor ramp-up to maximum capacity; Tent Network for Technology Implementation (TENTNET), a Department of Defense, industry, and academia forum is being utilized to facilitate discussion on standardization and technical aspects of existing and new shelter product lines; confirmation of surge and sustainment requirements from the Services through the analysis of peak wartime demand data versus the current WRM submissions, to allow DLA to estimate the level of contingency stock needed so appropriate levels of funding can be requested.

As a result of this study, FY07 Supplemental Funds have been requested. Also, an Issue Paper in the Program Budget Review FY08 has been submitted. The MSR Study will assist in determining overall funding needs. TENTNET, which is in the early stages of implementation has assembled a core group to include DLA, the Services, the major manufacturers and leading academics to raise, discuss and resolve key technical

and industrial base issues in the manufacture and supply of both fabric and finished tent and shelter systems.

Tray Pack Ration Readiness (October 2006)

Tray pack rations are a member of the family of DoD field combat rations. They are used to sustain groups of military personnel in highly mobile field situations. The component items are thermally processed, shelf-stable foods, packaged in hermetically sealed, steam table-sized metal or polymeric (poly) containers. DoD contingency requirements for tray pack rations greatly exceed peacetime requirements. Current issues include:

- A food industry which has moved to polymeric trays commercially for shelf-stable food service items. The Services have also transitioned from metal tray cans to the polymeric tray for their peacetime requirements. This is in concert with developing new technologies for reducing costs and moving toward commercial applications.
- Funding of \$3.165M in Government Furnished Equipment (GFE) to purchase and upgrade equipment to further expand capabilities to produce polymeric trays is on target. This includes one poly can tray seamer machine, the upgrade of one poly can seamer, and five thermo-hydro processing machines (retorts).
- The identification and aggressive pursuit of using 3 Kilo retort pouches for pumpable items in lieu of fill and seal trays to further ensure the industry's capability to meet both the peacetime and wartime demands. These pouches should be seen with the roll out of the FY07 menus for the Unitized Group Rations (UGRs).
- With the roll out of pouches for UGR menus, plus the purchase and refurbishment of equipment, there will no longer be a benefit to prepositioning of the tray pack metal cans. Therefore, the funding for the storage of these metal cans is no longer being requested.

Virtual Wartime Visibility Readiness Investment Follow-on (October 2006)

The Executive Agent responsibilities that fall within the purview of DLA use Commercial Asset Visibility (CAV) contracts for visibility within the supply chain to support events such as OEF/OIF and hurricanes Katrina and Rita. These CAV contracts maintain industrial base vigilance over commercial assets that can be utilized during a contingency or national emergency. Virtual Wartime Visibility (VWV) is a CAV program that integrates and leverages the commercial industrial base with government operations. The program maintains visibility over commercial food items in peacetime along with a readiness plan for obtaining actual product in case of a contingency or

national emergency. The VWV contract accesses market availability information for commercial inventories necessary to support the Other War Reserve (OWR) program.

The Subsistence Industrial Base Program (SIBP) office leverages the commercial industrial base manufacturing capability to respond to the readiness needs of the Services in the event of a surge in military requirements. Shortfalls identified in the FY06 analysis for components to support the group feeding ration programs were primarily in commercial components. Although commercial in nature, the food pack sizes needed to fit group ration space constraints are not traditionally produced for use in commercial food service operations. Vast quantities of de facto military unique packaged food products would be required to support two Major Theater War (MTW) scenarios. In order to perform a valid risk assessment to determine if increased inventory was necessary, a list of these components was provided to VWV. When components are available from another source, the SIBP office will, where feasible, establish contractual arrangements with those sources to obtain guaranteed contractual coverage for surge quantities. These agreements will leverage past successes such as stock rotation, surge equipment investment, long-lead sub-component pre-positioning, etc., to ensure that surge can be met, and that the offset against the OWR suggested by VWV is contractually assured.

The VWV provides a tool for the SIBP office to determine availability for commercial assets over an entire commercial market. VWV summarizes the expertise and resources of the U.S. commercial food industrial base through a single vendor with real-time on-line information systems. It allows the government to reduce the overall costs and time involved in planning and maintaining visibility over commercial inventory levels and available manufacturing capability. This program allows for oversight of the OWR program shortfall of over \$300M worth of assets. For the cost of approximately \$120K per year, the government receives access to over \$600M commercial inventory for potential use in support of readiness items.

Bradley Fighting Vehicle System - Transmission Race Follow-on (November 2006)

DLA entered into a long-term corporate direct vendor delivery (DVD) contract with General Dynamics Land Systems (GDLS) to provide parts for various land weapon systems including the Bradley Fighting Vehicle System (BFVS). GDLS identified a very long lead-time for the specialty steel as the major production constraint in meeting the sudden surge and sustained higher monthly demand for the Hydraulic Motor Race, a key component of the BFVS transmission. An industrial capability analysis was performed and determined that the best industrial solution was to pre-position (protected) raw material stock of a special grade steel to reduce the production lead time for the race assembly. DLA invested \$300K with industry which provided enough pre-positioned specialty steel by June 2006 to meet the six-month wartime planning requirements and sustain that level of production for up to one year until the receipt of the next delivery of steel. This investment saved over twelve months of production lead time. Delivery orders now in-process take advantage of the production lead time

savings. Additionally, acquisition planning is underway to insure that the investment can be utilized on similar special steel purchases required in the future.

Cesium Lamp Cartridge (November 2006)

DLA updated its industrial capability assessment on cesium lamp cartridge supply, sole-sourced to BAE Systems, who relocated in July 2006 to Ontario, California. These cartridges are a vital component in the infra-red counter measures used on aircraft such as the KC-130 and P-3 and the HH-53, H-46, and CH-53 helicopters. A Warstopper Program investment in sub-component kits in-place at BAE's facility has effectively reduced the lead-time for the end item from 330 days to 30 days. The Agency's updated increased requirements estimate of wartime demand has been approved after a Services' review of new peak wartime demand data. Due to a sharp drop in current Service demand and a rapid increase in Agency stocks, DLA conducted a Minimum Sustaining Rate (MSR) production study to inform decisions associated with maintaining the industrial base capacity for BAE, the sole-source manufacturer. The Agency will seek additional funding from the Warstopper Program to maintain its readiness position and approval/funding is expected.

4.7 Missile Defense Agency (MDA)

The MDA will consider the findings of these studies in implementing its evolutionary strategy for missile defense systems, a strategy that capitalizes on missile defense technology advances and incorporates these improvements to adjust to threat and policy changes as appropriate. MDA has issued no internal organizational guidance into the Agency's budget, allocation, or weapons acquisition decisions during the calendar year 2006 based on the findings of these industrial and technology capabilities assessments. MDA has made no specific strategic budget, acquisition, or logistics support decisions as a result of the findings of the assessments. MDA has, however, initiated an FY07 effort to further the development and qualification of Lyocell technology in an effort to ensure the sustainment of ablatives.

Space Tracking and Surveillance Satellite System Industrial Capability Assessment (January 2006)

DCMA IAC was requested by MDA to perform an industrial capability assessment of the Space Tracking and Surveillance Satellite (STSS) as it progresses from the Space Based Infrared System (Low) satellite constellation to the STSS System. Eleven contractors performing non-classified space-based sensor related work were assessed for the study. An overhead rate analysis was also performed at three selected space-based sensor providers.

The study concluded that the industrial base is sufficient for space tracking and surveillance satellite production. Battery, tracking and acquisition sensors, solar cell and super precision bearing manufacturing capabilities are recommended to be monitored. Additionally, the study recommended that MDA continue to fund advanced space based sensor development technology activities to include acquisition-to-track hand over, midcourse tracking, dual mission data processing, autonomous operation, discrimination, and satellite-to-satellite hand over.

Surveillance Satellite Assessment (January 2006)

MDA surveyed and assessed the industrial capability and viability of the surveillance satellite industrial base. The study focused on two targeted systems: MDA's Space Tracking and Surveillance Satellite (STSS) and the Air Force's Space-Based Infrared System (SBIRS-High). The study focused on those sites integrating surveillance satellites or sub-assemblies and developing or manufacturing subcomponents for surveillance satellites. The study focused on the identification of sole/single sources, foreign sources/dependencies, and other risks, such as business and financial.

The analysis identified two high financial risk suppliers which the Department continues to monitor.

The study identified two domestic sole-source suppliers and two foreign owned sole-source suppliers. Thales (United Kingdom) may become a sole foreign supplier of solar panel coverglass if JDS Uniphase, a domestic source, exits the business. Additionally, Eagle-Picher is a sole-source supplier for nickel hydrogen batteries for the STSS and SBIRS-High satellite systems. The study also identified Timken Super Precision as a sole source supplier for ball bearings and Belgium-owned Umicore as a sole source for germanium for solar cells.

Overhead rates will remain high at payload and satellite integrators due to low volume production, long acquisition cycles and the unpredictability of new business. No skill shortages were reported.

Current MDA budgeting allocations and program logistics guidance and decisions are being evaluated based on the findings of this assessment.

North American Rayon Corporation Rayon Assessment (June 2006)

Carbonizable Rayon Fiber (CRF) is used to produce solid rocket motor nozzles. Before North American Raytheon Corporation (NARC) exited the business in 1997, the Department acquired what it believed would be sufficient CRF to meet all then-projected DoD requirements for that material. DCMA was requested to identify all types of CRF used and being developed globally, validate the amount of NARC CRF still stockpiled, estimate current and future DoD requirements, identify excess CRF in the stockpile, and identify future viable alternative materials/sources. The DCMA-IAC compiled orderbook and capacity utilization information through site visits to the stockpile manager, two prime Solid Rocket Motor (SRM) manufacturers, and a distributor. DCMA also developed a usage outlook of CRF for the Department of Defense and National Aeronautics and Space Administration that estimated potential program shortfalls. DCMA found that DoD stocks will be depleted by 2010, but some programs will experience supply shortages as early as 2007 or 2008.

MDA secured an amount of NARC rayon to meet its current and near future program requirements. This avoided a potential shortfall of qualified CRF while alternative materials/sources are qualified; and allows the Department sufficient time to develop an alternative CRF acquisition strategy or mitigation plan.

North American Rayon Corporation Fiber Assessment (June 2006)

The study focused on determining the risk to DoD programs due to North American Rayon Corporation (NARC) fiber stockpile depletion, estimating depletion date of the existing rayon stockpile, and identifying viable alternative materials.

Rayon based carbon phenolic tape is used to manufacture solid rocket motor nozzle components. The rayon market has diminished significantly because of the

decline in use for apparel and stricter environmental standards have resulted in plant obsolescence. It is estimated that the NARC rayon stockpile would be depleted by the end of 2010 for DoD and commercial users, the second quarter of 2013 for the National Aeronautical and Space Administration, and the end of 2009 for Atlas, Delta IV and Standard Missile 3.

The study recognized that Government and industry are taking steps to ensure the sustainment of ablatives with alternative materials. Three potential alternatives to rayon are undergoing qualification including Raycarb C2, the most viable alternative, followed by Enka and Lyocell. MDA has initiated an FY07 effort to further the development and qualification of Lyocell technology.

Solid Rocket Motor R45 Binder Assessment (August 2006)

DCMA was tasked to conduct an assessment with Solid Rocket Motor (SRM) prime contractors, NASA and Military Services to validate the importance and dependency of a sole source provider of Hydroxyl-Terminated Polybutadiene (HTPB) R45 polymer for propellant binder and explosive for insensitive munitions.

The assessment determined HTPB R45 polymer orderbook, availability and capacity utilization through site visits to the binder supplier and two prime SRM manufacturers, and also developed a business outlook for the plant providing the polymer. To avoid potential interruption of R45M binder supply with no alternate domestic propellant binder source, the Department of Defense and NASA initiated immediate discussions with the supplier to ascertain its future intentions. As an outcome, the Department and/or MDA developed a binder acquisition strategy, or mitigation plan. The potential interruption of R45M binder was overcome in July 2006 by the decision of the binder supplier's parent to fund its capital requirements to meet EPA regulations and increase production efficiencies. A recommendation was for the Department to continue monitoring the supplier closely.

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5. Industrial Sector Summaries

5.1 Aircraft Sector Industrial Summary

The aircraft industrial base produces fighter/attack aircraft, vertical lift aircraft, transport/cargo aircraft, large fixed wing aircraft (i.e., aerial refueling tanker, Intelligence, Surveillance, and Reconnaissance (ISR), and multi-mission aircraft), trainers, and unmanned aerial systems.

Prime contractors have procurement orders from the Department of Defense for the next ten years. Lockheed Martin and Sikorsky have programs identified today that will carry production into the next 20 years. Boeing's future in the fighter/attack and transport segments is questionable. With the recent announcement of the C-17 program shut down coupled with the end of the F/A-18E/F production in FY11, the industrial base infrastructure at Long Beach, CA, and St. Louis, MO, may have insufficient business to continue in place.

The supplier industrial base may consolidate as military programs reduce over time. Suppliers not associated with future production programs (for example, suppliers not participating in the F-35) will be impacted the most. These suppliers will be forced to either exit the business or find new programs for their products.

Global partnerships have been increasing as European contractors have either formed an alliance or established domestic subsidiaries in the United States in order to better compete for U.S. defense-related programs. Today, the majority of aerospace suppliers supporting DoD programs are still U.S. suppliers. However, participation from global contractors is increasing. Recently, the Department awarded two helicopter programs that use airframes of European design. As such, the supplier support for these airframes will rely more on a global supply chain.

Nine (forty-five percent) of the aircraft programs reported in the Defense Acquisition Executive Summary (DAES) have reported medium to high cost risk.

Research, Development, Test and Engineering (RDT&E) funding for aircraft programs is decreasing from \$11B in FY06 to \$4B in FY11 primarily due to the reduction of F-35 (Joint Strike Fighter (JSF)/Lightning II) RDT&E funding as the program transitions from System Development and Demonstration (SDD) phase and into production. Also, there are more vertical lift programs using non-developmental airframes that install subsystems to meet their unique mission requirements.

Procurement funding will peak in FY10 at \$25.9B. The increased funding between FY07 and FY09 is caused by an increase in production of the F-35 JSF Lightning II fighters as well as several vertical lift aircraft production reaching their maximum rate in these years.

Both RDT&E and procurement funding profiles will change as Pre-Major Defense Acquisition Programs (MDAP) emerge as MDAP programs.

Issues:

- Titanium availability is a significant issue within the aerospace industrial base. As future aircraft, both military and commercial, use more titanium in their design, it will more put pressure on the titanium industry as it also tries to meet demand from other industries such as automotive, health and industrial. Currently the shortage of titanium, coupled with long lead times, has delayed the production of airframe bulkheads, landing gears, and engine components.
- Unmanned Aerial Vehicles (UAVs) represent a developing product segment in which all contractors have an interest. Either by direct programs from the Department or through Independent Research and Development (IRAD), contractors are developing various UAV types to maintain a technological edge in their segment. These developments will lead to new developments in areas such as aircraft collision avoidance with other aircraft (i.e., manned and other UAV) and better flight autonomy programs. Without a pilot, these aircraft can perform at higher thresholds, therefore, requiring more demanding structural concepts and designs which may lead to new manufacturing processes and provide future growth in the aerospace industrial base.

5.2 Command, Control, Communication, Computers, and Intelligence (C4I) Sector Industrial Summary

C4I programs represent the backbone of the combat capability of our forces. Overall DoD procurement growth trends also are reflected in Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance (C4ISR) program budgets. It appears that there is sufficient procurement funding in C4ISR programs to sustain essential C4ISR industrial capabilities.

FY05 through FY11 continues the System Development and Demonstration Phase of the Joint Tactical Radio System Airborne Maritime/Fixed (JTRS AMF) Cluster. JTRS is a family of radios that will replace and integrate various incompatible Service radios. Funding also is budgeted for the migration of the Multifunctional Information Distribution System-Low Volume Terminal (MIDS-LVT) to JTRS compliance and continues the procurement and installation of MIDS-LVT System, Super High Frequency, and Extra High Frequency terminals, and in providing for upgraded power distribution and enhanced connectivity accomplished during equipment installations. Funding continues for the Advanced Tactical Data Links system, ensuring timely transmission of surveillance, targeting, engagement, combat identification, and battle damage assessment information over networks.

In general, most U.S. and European defense C4ISR contractors are in good financial condition. The U.S. C4ISR contractor base is comprised primarily of BAE Systems, Raytheon, General Dynamics, Northrop Grumman, Boeing, Lockheed Martin, ViaSat, Data Solutions, and SAIC. For the most part, prime C4ISR contractors are able to meet programmatic technical performance requirements. Four of the existing ten C4ISR MDAP programs tracked by DAES indicated some concerns (Nunn-McCurdy unit cost breach in one case, certification, schedule breaches due to changes to user requirements, etc).

Issues:

- C4ISR products increasingly have become dependent on commercial information technology (IT) products. These commercial industry segments have increasingly globalized their supply chains. Both of these facts contribute to the Department's very limited leverage in these markets. There is often little incentive for commercial companies to modify their procedures to meet the peculiar requirements of the government, particularly if these changes would impact a firm's competitiveness.
- There are supply chain risks as U.S. contractors move software development work offshore for economic reasons. For example, the potential security ramifications inherent in malicious code (e.g., Trojan horses, back doors, and time bombs) increase. Maintaining the ability to leverage commercial markets while minimizing risk continues to be a focus area for the Department.
- Workforce concerns evident in software development represent a challenge for all DoD systems, including C4ISR systems. The Department is engaged in a two-part *Software Industrial Base Study* (SIBS) to assess the demand for software within the Department and the industrial base's ability to satisfy that demand. SIBS Phase 1 was completed in October 2006. Given the understanding generated about the uniqueness and complexity of software, the study concluded that the overall pool of software developers appears to be adequate. However, a supply-demand imbalance exists in the upper echelons of the software developers/ management cadres, exacerbated by the fact that this talent is not fungible outside their domain of expertise. SIBS Phase 2 is under contract to formulate and recommend solutions to the concerns highlighted in Phase 1.

5.3 Ground Vehicles Sector Industrial Summary

Ground Vehicles are categorized into tactical, wheeled-combat, and tracked segments. The High Mobility Multi-Purpose Wheeled Vehicle (HMMWV) is an example of a tactical vehicle, Stryker an example of a wheeled-combat vehicle, and the M-1 Abrams Tank an example of a tracked vehicle. Distinctions between tactical and combat vehicles are beginning to blur with recent operations in Iraq and Afghanistan. Today there is increased importance accorded to armor tactical systems for the urban

warfare environment and to also lighten combat systems to improve transportability and fuel efficiency. Vehicle subsystems are categorized in five main areas—power train, armament, structures, suspension, and electronics. Some of the industrial differences that help distinguish one segment from another relate to:

- power train and suspension (wheeled versus tracked) ,
- armament (defensive versus offensive),
- armor (passive – steel/aluminum, composites – tiles/plates, and reactive - explosives), and
- electronics (control, targeting, communication and also manned versus unmanned).

The majority of suppliers in this sector are responding extremely well to significantly increased requirements in support of contingency operations. Supplemental funding in FY06 for vehicles totaled \$15.9B, which was in addition to the \$30.9B budgeted by the Army. The Army ground vehicle procurement funds for FY05 through FY11 are \$36.6B in then-year dollars including current and previous year, but not future year supplementals. However, the Department must maintain and in some cases increase the rate of overhaul and repair of the vehicles currently in Iraq and Afghanistan. The cost of this work is estimated at \$17B to \$19B annually for several more years as compared to \$2.5B to \$3B per year on overhaul and repair before the war.

Of the five vehicle programs tracked by the DAES, only one is experiencing production issues and in that instance, the supplier is increasing capacity to meet a significantly-increased delivery requirement that occurred earlier in 2006. For the most part, schedule requirements are at or within the prime contractor's capacity to achieve. As a whole, there are no systemic problems associated with any particular prime or the industry as a whole.

Due in particular to several years of added supplemental funding and the Future Combat System (FCS) program, business metrics indicate that the ground vehicle prime contractors are profitable. As a result, they currently are able to meet financial obligations, are generally consistent in providing value to shareholders, and are investing back into their businesses via research and development and capital expenditures.

The significant drawdown of defense budgets during the 1990s reduced the number of major ground vehicle prime contractors for wheel combat and tracked vehicles from more than eleven to two, currently General Dynamics Land Systems (GDLS) and British Aerospace Engineering (BAE) Ground Systems Division. They each possess unique industrial capabilities, and as result, have partnered to support the FCS program. At the same time, GDLS is engaged in new production of the Stryker and Expeditionary Fighting Vehicle development. With the exception of the FCS Non-

Line-Of-Sight Cannon, BAE does not have any major new production work; but it is engaged in a significant program upgrade for the Bradley Fighting Vehicle.

Three combat wheeled and tracked vehicle programs tracked by DAES have cost growth issues primarily derived as a result of changing quantities from those in the approved acquisition program plan. The fourth combat wheeled/tracked program is not experiencing a cost problem. However, the FCS, still is early in RDT&E. The fifth DAES-tracked vehicle program is a tactical vehicle, but is not experiencing cost problems at this time; however, it is experiencing production problems, due to increased production quantities.

Three of the newer combat wheeled and tracked vehicle programs monitored by DAES are having difficulty meeting technical performance requirements. These programs are in RDT&E or early production. Technical issues include reliability, survivability, maintainability, weight and size constraints, and the maturity of C4ISR technology. Two mature production programs also monitored by DAES, the Bradley Upgrade and the Family of Medium Tactical Vehicles, are not experiencing performance or testing issues.

There are “important” component suppliers for the ground vehicle industry. Examples of “important” components include tracked vehicle transmissions from Allison, rubberized track assemblies from Goodyear North America Tire, and military unique forgings and castings.

Issues:

Ability to leverage Commercial Technologies

- Advanced power-generation systems
- C4ISR Consolidation and Net-Centric systems
- Improved vehicle components
- 360 degree awareness
- Speech technology
- Drive-by-wire

Ability to Address Current Threat

- Increased Survivability
 - Improvised Explosive Device (IED) protection and defeat
 - Active Protection System (APS) & Lighter/Stronger Armor
 - Passenger Safety
- Common Power Distribution / Databus System
- Common Operating System – Hardware / Software
- Jammers for IED defeat

Ability to continue to maintain legacy systems while addressing the above

5.4 Missile Sector Industrial Summary

Missiles are classified into four segments—tactical missiles, strategic missiles, ballistic missile defense systems, and smart munitions. Generally, missile subsystems are categorized into four main areas—propulsion; armament; airframe; and navigation, guidance, and control (NGC).

The DoD missile procurement funding level for FY05 through FY11 is roughly \$32B in then-year dollars. Tactical missiles account for almost 40 percent of the procurement, with strategic missiles taking a little more than 30 percent. The procurement funding in the ballistic missile defense sector is for the PAC-3 and Standard Missile programs.

The Department's RDT&E funding is about \$44B over the FY05-FY11 period. More than 90 percent of the funds are for ballistic missile defense systems. At this time, RDT&E funding for tactical and strategic missiles and smart munitions segments is \$1B per segment over the seven year period of FY05 through FY11. Many of the missile design and development industrial capabilities necessary for these segments are supported by the work performed in the ballistic missile defense systems including propulsion, airframe, warhead, navigation, guidance, control, and reentry vehicles for strategic systems.

The Department's missile prime contractors are profitable, able to meet their financial obligations, generally consistent in providing value to their shareholders, and willing to invest back into the company via research and development or capital expenditures.

Of the 16 missile programs tracked by the DAES, four programs reported delivery issues in 2006. The problems do not appear systemic to a particular prime or the industry as a whole. Delivery recovery plans have been implemented.

The significant drawdown of defense budgets during the 1990s reduced the number of missile prime contractors from more than twelve to six. The prime contractors are not necessarily equal in industrial capabilities. Three of the primes operate in only one of the missile segments (Boeing: Smart Munitions, General Dynamics: Tactical Missiles, and Textron Systems: Smart Munitions). General Dynamics has only one program in the tactical missiles segment—the 2.75" rockets (Hydra rockets). Textron also has a single program, the Sensor Fuzed Weapon (SFW).

Lockheed Martin and Raytheon programs account for roughly 80 percent of the Department's missile procurement funding. Eighty-five percent of the Department's RDT&E funding goes to missile programs where Raytheon and Lockheed Martin are the primes. This indicates that while there is competition in this sector, it mostly is limited to two contractors. As one might expect, Raytheon and Lockheed Martin are the prime contractors on the majority of DoD missile programs and both have a mix of missile segment programs (tactical, ballistic missile defense, etc.). Program funding streams

remain fairly stable across the Five-Year Defense Plan (FYDP). This provides the basis for a healthy missile industrial sector. The Department's primes are challenged to retard cost growth. Fifty percent of the programs tracked by the DAES identified cost growth issues.

For the most part, DoD primes are able to meet technical performance requirements. However, five programs identified technical issues. Four of the five programs are tactical missiles equally spread among Lockheed and Raytheon programs.

"Important" components in the missiles industry segment include thermal batteries, tactical missile rocket motors, jet engines, inertial measurement units (IMUs), GPS receivers, seekers, fuzes, and warheads. These components are considered to be "important" because they are used on multiple programs and some of these components require 12 months or more to manufacture.

Issues:

- Bottlenecks in the supplier base remain. There is limited excess production capacity available to support production acceleration of key components such as thermal batteries, IMUs, and GPS receivers should that become necessary.
- While there is reserve capacity available for certain important components, the time required to accelerate production to maximum facilitated rates for rocket motors, jet engines, IMUs, seekers, fuzes, and warheads will exceed 12 months.
- Due to added complexity, the Department will not be able to ramp production of standoff tactical missiles—likely to be the precision guided munitions of choice for the next conflict—as quickly as it accelerated JDAM and Laser-Guided Bomb (LGB) kit production for Operation Enduring Freedom and Operation Iraqi Freedom (OEF/OIF).

5.5 Shipbuilding Sector Industrial Summary

The shipyard facilities that make up the defense shipbuilding industrial base consist of two primary segments—first tier and mid-tier shipyards. Collectively, these shipyards produce six functional products—submarines, aircraft carriers, amphibious ships, surface combatants (cruiser, destroyer, littoral combat ship), sealift, and research/special vessels. Major ship subsystem providers can be categorized as system integrators, mission system integrators, armament, mission systems providers, propulsion or main engine providers, and yard/builder providers.

Six major U.S. shipyards build nearly all of the Navy's ships. Those shipyards are Newport News, Avondale, and Ingalls, owned by Northrop Grumman (NOC); and Electric Boat, Bath Iron Works, and National Steel and Shipbuilding Company, owned

by General Dynamics (GD). Some of the first-tier shipyards have unique capabilities that affect how the Navy and Congress have allocated new-construction contracts.

Little first tier shipbuilding capacity is devoted to the commercial sector which places an increasing overhead burden on Navy and Coast Guard shipbuilding programs, which in turn, are producing fewer ships in the available plant capacity as shipbuilding costs continue to rise at a rate well in excess of inflation. In fact, U.S. commercial shipbuilding accounts for less than one percent of world commercial shipbuilding output and 80 percent of this output comes from the mid-tier sector.

U.S. Shipbuilders have produced the most capable warships in the world. An ODUSD Industrial Policy benchmarking study, however, indicated that shipbuilding manufacturing technology improvement and productivity improvement have on average significantly lagged international yards. Shipbuilders have asserted in Congressional testimony that funding instability and multiple changes in build rate plans are significant factors in shipbuilding cost increases and lack of facility investment. In response to the shipyards' calls for a stable plan, the Navy developed a 313 ship force structure plan in 2006 that offers some needed stability for the major primes in the FYDP and will incorporate block purchases and multi-year procurement where authorized.

Hurricanes Katrina and Rita shocked shipbuilding production in the Gulf Coast. Northrop Grumman and mid-tier shipbuilders have been able to rebound, although at higher cost of production. Workforce flux, and lingering absenteeism in the Gulf Coast persist as a result of post-hurricane rebuilding that is exacerbating existing workforce constraints due to aging and attrition. Additionally, the National Shipbuilding Research Program (NSRP), an industry collaboration, recently reported in a panel project from a 2005 survey that workforce weaknesses in technical skills and academic skills persist as a result of a green replacement workforce. The *Global Shipbuilding Industrial Base Benchmarking Study - Part 2: Mid-Tier Shipyards, January 2007* sponsored by ODUSD Industrial Policy and the Office of Naval Research confirms that shipbuilding capacity in the mid-tier shipyards is limited by skilled workforce constraints and not by facilities.

Parallel recapitalization of the Navy's aging fleet and naval air likely will pressure RDT&E spending. Furthermore, the Navy is challenged to deliver existing programs on cost. The Navy's 313 ship plan combined with all of the aircraft implied by that plan would cost an average of about \$53B a year for the next three decades. That amount is 23 percent higher than the Navy's annual spending on ships and aircraft between 2000 and 2005. The Navy estimates that procuring the new ships to meet a sustained 313 ship battle force requirement will cost about \$14.4B a year. There is significant risk associated with the Navy's ability to sustain this level of investment without major industrial productivity improvements and material cost stabilization or reductions. Possible industrial responses include further consolidation to more sole-source facilities or elimination of excess capacity.

Some shipbuilding programs have successfully sought funding to develop design-for-producibility cost reduction efforts to lower overall program costs. The

VIRGINIA class submarine second production contract contains capital expenditure (CAPEX) and process improvement incentives to reduce cost. To date, five proposals worth \$40.2M have been approved. In total, the five approved CAPEX projects are expected to save the program over 3.7 million manhours (\$320M).

The persistent inability of the industrial base to meet cost targets indicates that the Navy and Coast Guard may not be able to recapitalize fully and portends a continued downward trend in the defense shipbuilding industrial base.

Most indicators suggest that the domestic shipbuilding industrial base capacity and capability are sufficient to meet current and projected battle force requirements, albeit at a cost premium that may exceed the government's desire to allocate sufficient resources to shipbuilding. Financial conditions and ample profitability highlight the shipbuilding industry as possessing a generally stable business base with low levels of debt. The receipt of progress payments from the Navy contributes to the industry's financial stability as does a commitment to stabilize requirements.

Issues:

- Significant excess plant capacity exists in the shipbuilding industrial base, driving up overhead costs. The Navy's stated intention to build LCS and other classes of ships in the competitive mid-tier sector may be adding additional capacity the industrial base does not need. ODUSD(IP)'s mid-tier benchmarking study warned that re-configuration of mid-tier shipyards to build naval ships will likely make them non-competitive in the commercial market as has happened in the first-tier sector. The additional plant capacity dedicated to naval ship building also could exacerbate cost challenges in programs built in the large yards, which account for well over 85 percent of future shipbuilding funds.
- An increasing number of sub-tier suppliers are becoming sole-source naval shipbuilding suppliers, completely dependant on government funding. Those suppliers who build military unique components for submarines and other battle force ships will also likely struggle as their workforce ages and fewer orders are received to cover plant costs.
- The unique submarine design industrial base could downsize significantly, much as happened during the United Kingdom's hiatus from new submarine design. In the United Kingdom, this resulted in large cost overruns and schedule delays as it sought to deliver an attack submarine class to replace an aging submarine fleet. The United States could face a similar challenge to reconstitute a design base when a replacement for the Trident class submarine is needed. RAND recently conducted a study that identified the critical skills that must be retained to sustain and reconstitute this part of the shipbuilding industrial base.

5.6 Space Sector Industrial Summary

The space industrial base supports two primary segments: on-orbit hardware and launch systems. The on-orbit hardware subsystems are categorized in five main areas: spacecraft, propulsion, command and control, telemetry, and payload. Launch systems are subdivided into liquid-propelled rockets, solid rockets, guidance and control, and payload. The segments are configured to support four primary military and commercial markets: early warning and surveillance, communications, weather, and navigation. The segments also support civil and emerging commercial markets in manned space and exploration.

DoD space procurement funding is at all-time high levels due to the re-capitalization of space systems for all military missions, including early warning and surveillance, communications, weather, and navigation. The DoD space procurement funding level for FY05 through FY11 is roughly \$11B in then-year dollars. Military satellite communications systems and launch vehicles account for the majority of the funding with surveillance and early warning systems, weather systems and navigation systems accounting for remainder.

The Department's space research and development funding is about \$31B across the FYDP. More than 50 percent of the funds are for the military satellite communications and for early warning. This funding includes the RDT&E for the on-orbit space subsystems and for new launch system design and development. This also includes Missile Defense Agency funding for space-based missile early warning capabilities.

Seven major defense acquisition programs are tracked by the DAES. All have reported delivery issues. The problems have been related to systemic issues of immature technology and low budget estimates in space vehicle program procurement. Delivery recovery plans have been implemented.

The business metrics used in this assessment indicate that the Department's space primes are profitable, able to meet their financial obligations, generally consistent in providing value to their shareholders, and willing to invest back into the company via research and development or capital expenditures.

Three prime contractors account for the majority of major defense space programs: Boeing (Global Positioning System II, Wideband Gapfiller Communications, Evolved Expendable Launch Vehicles, and the Future Imagery Architecture), Lockheed Martin (Global Positioning System II, Space Based InfraRed System, Advanced Extremely High Frequency Communications, and Mobile User Objective Communications), and Northrop Grumman as the prime contractor on the weather satellite system National Polar-orbiting Operational Environmental System and on the Missile Defense Agency Space Tracking and Surveillance System. Recently Northrop Grumman and General Dynamics were awarded design contracts for the Alternative InfraRed Satellite System. Orbital Sciences Corporation provides its Taurus and

Pegasus launchers to the Department of Defense. Lockheed Martin and Boeing formed the United Launch Alliance to provide Atlas and Delta launch vehicles to the Department.

Lockheed Martin and Boeing account for the majority of the Department's space procurement funding. This indicates that while there is competition in this sector, it appears mostly limited to four prime contractors, the two mentioned plus Northrop Grumman and General Dynamics. Program funding streams for space programs will increase and then level off across the FYDP. This provides the basis for a healthy space industrial sector. It is notable that three large programs are in competition and have yet to award contracts—Space Radar, Global Positioning System III, and Transformational Satellite Communications.

The Department's space programs have had significant cost growth. Historically, research, development, testing and evaluation costs for DoD's space systems have grown by an average of 69 percent from the original development estimates, and procurement costs have risen by 19 percent, on average, according to the Congressional Budget Office.

For the most part, DoD space primes are able to meet technical performance requirements. Only one program identified technical issues that required significant changes to the satellite payload. Progress is being made on the National Polar-orbiting Operational Environmental visible radiometer payload. In addition, the Space Radar and Transformational Communications Satellite programs are focusing on technology requirements and risks prior to award.

"Important" sub-tier suppliers include nickel-hydrogen and lithium ion batteries, traveling wave tubes, space qualified solar cells, control moment gyros and radiation hardened circuits, and precision space bearings. The risk of a demand gap for RS-68 rocket engines in the next four years also is an issue to be monitored. These components are used on multiple programs and some of these components require 12 months or more to manufacture. In addition, the commercial market size is small and research investment is low for these technologies.

Issues:

- Bottlenecks in the supplier base remain. There is limited excess production capacity available to support further production acceleration of key components such as space batteries, traveling wave tubes, and solar cells.
- Concern that U.S. Government export restrictions are increasing costs and causing delays for primes and sub-tier space hardware providers. The Air Force is examining sales restrictions and export controls for their effects on U.S. supplier sales, revenues, and world market share.
- Workforce concerns exist for U.S. Government space oversight and acquisition personnel and for space manufacturing primes and sub-tier suppliers.

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6. Related Activities

The Department of Defense's preferred approach to establishing and sustaining the defense technology and industrial base is to leverage its research, development, and acquisition processes and decisions to create a competitive environment that encourages industry to make sound technology development investments, and to make sound technology insertion and production facility/capacity decisions. When market forces are insufficient, however, the Department uses powerful Defense Production Act tools to focus industry attention on critical technology development, accelerate technology insertion into manufacturing processes, create or expand critical production facilities, and direct production capacity towards meeting the most urgent warfighter needs.

6.1 Title III of the Defense Production Act

The availability of domestic production capabilities for critical defense technologies is an essential element of national security. Title III of the Defense Production Act (50 U.S.C. App. 2061 *et seq.*) is a program specifically designed to establish, expand, maintain, or modernize industrial capabilities required for national defense. A key objective of the Title III Program is to accelerate the transition of technologies from research and development to affordable production and insertion into defense systems.

To create the needed industrial capacity, Title III authorities provide for the use of financial incentives in the form of purchases, purchase commitments, the purchase or lease of advanced manufacturing equipment for installation in government or privately owned facilities, the development of substitutes, and loans or loan guarantees. Title III activities strengthen the economic and technological competitiveness of the U.S. defense industrial base and can reduce U.S. dependency on foreign sources of supply for critical materials and technologies.

In calendar year 2006, the Title III Program had fourteen projects underway, two of which were completed during the year.

Radiation Hardened Electronics Capital Expansion (December 2006)

This project made substantial capital investments as part of an OSD initiative, led by the Defense Threat Reduction Agency, to establish a state-of-the-art production capability for advanced (0.15-micron) strategic radiation hardened devices using commercially available microelectronics equipment modified for radiation hardened production. This capability was established at two domestic contractor facilities and will provide substantially higher electronic operating speeds and will lower the power/size of

electronics in space craft. The smaller size and higher performance made possible by the Title III capital expenditure (CAPEX) contribution to the project will generate highly leveraged savings for spacecraft in terms of size, weight, reliability, and launch costs. Radiation hardened electronics enable spacecraft to operate in challenging radiation environments resulting from nuclear threats and exposure to long-term natural radiation. Several defense programs require strategic radiation hardened microelectronics. Without Title III support, these programs will have difficulty achieving system performance objectives and insertion schedules. The project completed its technical and business objectives, and the Title III Program has begun monitoring the continued viability and commitment to the market by the contractors.

Rigid Polymer Materials (December 2006)

Title III created a capability to produce thermoplastic polymers with strengths and stiffnesses significantly greater than other high performance thermoplastics. These materials offer tremendous benefits including transparency, toughness, resistance to fire and heat and resistance to solvents. Even small amounts of these polymers dramatically improve the strength of structural foams. They are processible by a variety of methods, including compression molding, injection molding and extrusion. Unlike most thermoplastics they are easily machined. They are currently being evaluated for selective laser sintering. Expected products include: mechanical components such as bearings and gears; transparent coatings and lightweight armor for personnel and vehicle protection; thermal protective applications such as missile components and thermal barriers. High purity forms of the products are being used in electronics manufacturing and medical devices. The project achieved cost reduction, improvement and optimization of production processes, and the testing and evaluation of the material. The project met all of its technical and business objectives, and the Title III Program has begun monitoring the continued viability and commitment to the market by the contractor.

On-Going Projects

Beryllium Production

This project will ensure a continuing supply of primary (high purity) beryllium metal to the United States and its allies for defense and critical civilian applications. The current supply may be depleted in the near future when inventories of National Defense Stockpile (NDS) beryllium ingots are projected to be exhausted. Imports of beryllium cannot meet the purity levels required for defense applications. Critical strategic applications, where there is no suitable substitute for beryllium include: airborne Forward-Looking Infrared Radar (FLIR) systems for fighters and attack helicopters; guidance systems on existing strategic missiles; surveillance satellites; missile defense systems; and numerous others. The project will ensure future supplies

of high purity beryllium metal through a cost share program with private industry to build a new primary beryllium production facility.

Flexible Aerogel Materials Supplier Initiative

This project is establishing affordable production by a domestic supplier of flexible aerogel materials. Aerogels are nanoporous solids with up to 99 percent open porosity often called “frozen smoke.” Aerogel is the most thermally efficient material known. The nano-scale lattice and pores provide high performance with minimal weight and space. Military applications for high temperature thermal insulation include acoustic protection, infrared suppression and energy absorption. Many commercial applications for these same qualities are expected at lower temperatures. The project involves testing and qualification of the materials for potential applications and, eventually, a full scale, high volume production capacity.

Lithium Ion Battery Production

This project is establishing a U.S.-owned domestic source for lithium-ion batteries for use in spacecraft. Lithium Ion (Li-Ion) rechargeable battery technology provides higher power for longer durations with lower weight and favorable space constraints when compared to Nickel Cadmium (NiCd) or Nickel Hydrogen (NiH) rechargeable batteries. The Li-Ion battery offers the highest energy/power package of the developed batteries today. This technology offers designers a weight saving option when compared to other battery types for overall weapon systems performance. Additional advantages include better recharging capability with no memory effect and increased temperature operating ranges.

Military Lens System Fabrication & Assembly

The Title III Program is establishing a domestic capability for mono-spectral and advanced multi-spectral optical systems and lens components. It will develop a manufacturing capability for design, fabrication, finishing, coating, assembly, and testing of mono- and multi-spectral night vision optical systems that can be integrated into military and commercial surveillance systems. Multi-spectral systems are shared-aperture systems that allow widely separated wavelength bands to be transmitted through a common aperture and share common elements in the optical train. These systems offer considerable advantages to the warfighter including weight and volume reduction by allowing the warfighter to carry fewer pieces of equipment, improved performance by allowing both bands to utilize the full aperture of the systems, and optimized system design for a larger set of operating conditions/environments.

Mini-Refrigerant Compressors for Man-Portable Cooling

This project will establish a domestic production facility for mini-refrigerant compressors. Through Title III, a new production facility will be built and facilitated with manufacturing, assembly and test equipment. Applications for personal cooling systems encompass aircrew cooling, soldier cooling (both dismounted and within ground vehicles), and personal protective equipment such as Explosive Ordnance Disposal (EOD) and Chem/Bio-Hazard suits. Further, the compactness of these mini-compressors enables them to be installed within electronics cabinets to provide active cooling of components. This increases the performance, reliability, and life of mission-critical electronics systems in high temperature environments. The project will demonstrate capability for full, sustained production capacity plus improvement and optimization of production processes.

Polyhedral Oligomeric Silsesquioxanes

The objective of this Title III project is to establish a production capability for Polyhedral Oligomeric Silsesquioxanes (POSS). POSS is a nano-sized material that, when used as a chemical additive, can greatly enhance the performance of polymers for a variety of DoD and commercial applications. The Navy and Coast Guard are currently evaluating POSS-based structural materials because they are extremely fire-retardant. Thin POSS coatings on integrated circuits, memory chips and solar arrays can provide radiation hardened performance in electronics. POSS can be incorporated into ablative rocket motor composites to improve the range, payload capability, and reliability of solid rockets. In a primary commercial application, POSS can also be used in food packaging (such as the plastic wrap around cheese or sausage) to prevent bacteria and viral penetration of the package, thereby providing a long shelf-life for food. The project calls for the contractor to conduct material testing and qualification in customer applications, marketing, business planning, and to obtain International Organization for Standardization (ISO) quality and environmental certifications.

Radiation Hardened Cryogenic Readout Integrated Circuits

This project will establish a viable, domestic foundry for commercial production of less than or equal to 0.35 micron, deep sub-micron Complementary Metal Oxide Semiconductor (CMOS) Radiation Hardened Cryogenic Readout Integrated Circuits (ROICs). RH cryogenic microelectronics is a critical technology employed in the manufacture of Focal Plane Arrays (FPAs) that are utilized in high altitude and space-based imaging and missile systems which must function in harsh natural or man-made radiation environments that are compounded by the cryogenic requirements of high altitude and space. RH Cryo Microelectronics process technology is used to manufacture read-out integrated circuits, which are integral components of FPAs. The next generation imaging requirements of high altitude and space-based weapon systems are dependant on the availability of advanced ROICs that provide high density with analog components, smaller pixels (increased resolution), increased functionality

(on-chip processing), lower power dissipation, lower noise, larger focal plane arrays (stitching technology), and better producibility (yield). All these improvements will collectively increase the mission capability of the systems.

Radiation Hardened Microprocessors

This Title III project is scaling up production capacities for high performance radiation hardened microprocessors with a progression from radiation tolerant to radiation hardened. The much higher clock rates will lead to significant performance improvements. Other benefits include cost and weight savings for space systems. Higher performance means greater on-orbit processing capabilities and lower ground support requirements. As with the other Title III radiation hardening projects, these microprocessors will enable spacecraft to operate in the hostile radiation environments of nuclear threats and long-term natural radiation.

Reactive Plastic CO₂ Absorbent

This Title III project will create a viable domestic source for a new rebreather technology which has been proven to be more consistent, safer, and easier for divers and rescue personnel. It is a technology that is utilized primarily in military scuba, submarines, space, and an array of homeland security applications to “clean” carbon dioxide (CO₂) from air needed for breathing. Reactive plastic CO₂ absorbent material is a technology that secures the CO₂ absorbing material to a plastic sheet in a polymer matrix bond; thus the term reactive plastic. Reactive plastic CO₂ absorbent cartridges are designed to greatly reduce variability from self packing and make change-overs quick and easy. Other advantages include stealth diving capabilities (i.e., no bubbles from the rebreather) with extended diving durations and reduced breathing effort by divers. Other applications include medical, fire rescue, and mining operations where inherently high risk of CO₂ contamination exists.

Silicon Carbide Devices

This project is establishing a domestic supplier of low cost, high performance silicon carbide (SiC) metal semiconductor field effect transistor (MESFET) monolithic microwave integrated circuits (MMICs) that can satisfy military requirements for advanced radar systems. The project will also demonstrate improvements in the characteristics of 100mm SiC substrate and epitaxial materials and processes to enable high yield, high performance and reliable SiC MMICs that can be produced at an affordable cost. The project will develop and demonstrate substrates and epitaxial structures with defect densities commensurate with high yield production of high performance, reliable SiC MMICs.

Spinel & ALON™

Title III financial incentives are being employed in this project to stimulate the creation of an economically viable domestic source to produce ALON™ and Spinel IR windows for targeting systems, missile domes, and transparent armor components at a significantly reduced cost to the Department of Defense. Aluminum oxynitride (ALON™) and magnesium aluminate spinel (Spinel) are extremely durable optical ceramics with excellent ballistic and transmission capabilities that are used in military applications for transparent armor, missile domes, and infrared windows. ALON™ and Spinel components demonstrate optical, physical, and mechanical characteristics similar to sapphire, but with significantly lower cost. Transparent materials currently used for armored vehicles, aircraft, missile domes, and infrared sensor applications require sophisticated, expensive manufacturing processes. Many have exhibited poor durability. ALON™ and Spinel components offer life cycle cost savings by increasing mean time between failure (MTBF) and decreasing logistics support required to procure, inventory, and distribute spares.

Thermal Battery Production

The objectives of this Title III initiative are to establish, strengthen, and expand a domestic source for advanced thermal batteries. Military unique, high performance batteries are the only viable power source for many defense systems. The Missile Defense Agency along with Service program offices have identified several high performance battery technologies for which there is insufficient availability or producibility to meet known and planned program requirements. These critical materials and technologies represent gaps that must be filled for the advanced systems to meet performance and production schedule goals. The Defense Production Act Title III Program is incentivizing a domestic company to scale-up and expand production capacity. The applicability of these critical batteries to a wide variety of DoD weapons systems offers Army, Navy, and Air Force program offices the ability to substantially improve system performance.

Thin Silicon-On-Insulator Wafers

This project is establishing a domestic full-scale production capability for thin silicon-on-insulator (SOI) wafers. Thin Film SOI electronic wafers are critical materials that enable the fabrication of radiation-hard, ultra large scale digital devices such as microprocessors, application-specific integrated circuits and static random access memories. These radiation hard circuits fabricated with SOI materials are essential to defense systems, such as surveillance, communication and navigation satellites, ballistic missiles, surveillance systems, and inertial navigation systems. They provide a superior technology for sensitive ultra-low power space and, battery-powered applications due to reduced power requirements, increased device density, and faster device performance over circuits fabricated in bulk substrate technologies.

Yttrium Barium Copper Oxide High Temperature Superconductor

This Title III project is establishing two domestic sources for high volume, high quality, domestic production capacity for second-generation (2G) High Temperature Superconductor (HTS) coated conductor. The conductor, based on Yttrium Barium Copper Oxide (YBCO) material, will be a higher-performance, lower-cost replacement for first-generation HTS wire. YBCO 2G superconductor is an enabling technology for defense applications which require high electrical power, especially megawatts. These applications include Advanced Capability Electric Systems, Directed Energy Weapons, and motors, generators, transformers, primary power cabling, power converters, high field magnets (such as gyrotron magnets), etc. Ship propulsion motors employing YBCO 2G conductors can be one quarter the size and one third the weight of conventional systems (including cooling systems). Additional benefits include higher net efficiency, substantial power & fuel savings, and inherently quieter. Complete development of the technology will lead to transfer of the YBCO coated conductor into electric power applications such as transformers, transmission cables, motors, fault current limiters, and generators. The project is accelerating introduction of second-generation HTS technology for military and commercial applications by three to five years.

6.2 Defense Priorities and Allocations System/Special Priorities Assistance

Title I of the Defense Production Act provides the President the authority to require preferential performance on contracts and orders, as necessary, to meet national defense and emergency preparedness program requirements. Executive Order 12919 delegates these authorities to various federal departments and agencies.

The Secretary of Commerce has been delegated the authority to manage industrial resources. To implement its authority, the Department of Commerce (DoC) administers the Defense Priorities and Allocations System (DPAS). The DoC has further delegated authority to the Department of Defense under the DPAS to: (1) apply priority ratings to contracts and orders supporting national defense programs; and (2) request the DoC provide Special Priorities Assistance (SPA) to resolve conflicts for industrial resources among both rated and unrated (i.e., non-defense) contracts and orders; and (3) authorize priority ratings for other U.S. federal agency and friendly nation defense-related orders in the United States when such authorization furthers U.S. national defense interests.

The Office of the Under Secretary of Defense for Industrial Policy (ODUSD(IP)) also convenes and chairs the Priority Allocation of Industrial Resources (PAIR) task force. The task force's mission is to ensure industrial resources are allocated to DoD

programs in accordance with operational priorities when emergent requirements create competing demands among Services. The task force typically uses SPA to request DoC allocate materials or expedite deliveries of defense items in accordance with PAIR decisions. During 2006, the PAIR was heavily involved in prioritizing deliveries of the ballistic backing material used in body armor. As a result, the PAIR has been able to balance delivery requirements and industry capacity, permitting normal business relations to resume.

Not all SPA requests are a result of PAIR actions. During 2006, ODUSD(IP) executed 12 SPA requests as depicted in the following table. With one exception, the SPA requests supported Operation Iraqi Freedom or Operation Enduring Freedom: five were on behalf of U.S. forces, six were for the United Kingdom and one was for Israel.

DEFENSE PRIORITIES AND ALLOCATIONS SYSTEM/ SPECIAL PRIORITIES ASSISTANCE CASES – 2006			
Date(s)	Item	Assistance for	Summary
01/06 through 09/06	Ballistic Material (Three SPA requests to cover deliveries in 2006)	Army/ Marines Corps	Directed ballistic material prioritization for the production and delivery of Small Arms Protective Inserts (SAPI), Enhanced SAPI, and Side SAPI Interceptor Body Armor (IBA).
01/06 through 08/06	Apache Helicopter Spare Parts (Six SPA requests)	United Kingdom	Sponsored industrial priority rating and expedited deliveries for the U.K. to procure sustainment items for Apache helicopter operations in Iraq.
06/06	SPA repair of vehicle armor machine tool	ISG Plate LLC (Mittal Steel USA)	Expedited repair of 8,000 HP Motor used to manufacture ballistic steel plate for combat vehicle armor.
08/06	Ruggedized Personal Digital Assistants (PDAs) SPA request	Israel	Sponsored industrial priority rating to expedite delivery of 1,000 PDAs in order to address an emergency situation in the North of Israel.
02/06 & 09/06	Counter-Improvised Explosive Device Systems SPA	Army/ Marines Corps	Issued notification to dozens of Department of Defense offices and industry suppliers that Counter-IED programs would be provided the highest industrial priority support in the event of a delivery conflict. Successfully sponsored DX priority rating for Counter-IED programs.
Source: ODUSD(IP)			

6.3 DoD Manufacturing Technology Program

DoD's Manufacturing Technology (ManTech) program develops and matures key manufacturing processes to accelerate technology improvements in the acquisition and sustainment of DoD weapon systems and components. Ensuring that technology is affordable and producible remains imperative to making our forces more agile, deployable, sustainable, lethal, and dominant anywhere in the world. This program addresses process technology issues early in the design process, in development, in production, and into sustainment. ManTech investments enable industry to develop and provide defense-essential, affordable, low-risk manufacturing processes that effectively transition technology into new and existing equipment for the warfighter. Teamed with industry, ManTech provides crucial links from technology invention to production of defense-critical needs that are beyond normal investment risk for industry. ManTech investments generally translate into affordability improvements or cycle time reduction. However, investments also focus on developing "new capabilities" that result in a more expensive component, but will provide dividends in system performance or life cycle cost that far outweigh initial cost. The program is structured around three major thrusts areas:



- *Processing and Fabrication* activities develop affordable, robust processes and capabilities for metals, composites, electronics, and energetics/munitions critical to defense applications over their full life cycle. Projects create improvements to manufacturing processes on the shop floor and in repair and maintenance facilities (depots, logistics centers, and shipyards).
- *Advanced Manufacturing Enterprise* accelerate implementing world-class industrial practices and advanced design and information systems in the defense industrial enterprise that supports weapon system development, production, and sustainment
- *Sustainment* projects coordinate common DoD requirements for maintenance, repair, and overhaul technologies and advancements to affordably extend current weapon systems beyond their intended operational life.

Although the requirement to submit a five-year plan for the ManTech program has been repealed with the deletion of 10 U.S.C. Section 2521(e), the Department continues to monitor the status of transition and implementation.

ManTech program success is measured by the transitioning of advanced technology from research and development to implementation into new or existing weapon systems. Examples include two projects that represent affordable technology transitioned to the warfighter as a result of manufacturing technology advancements.

ManTech Solves #1 B-2 Maintenance Issue

The Air Force Research Lab developed a new spray-on LO Magnetic Radar Absorbing Material (MagRAM) called "Alternate High-Frequency Material" to replace labor intensive taping materials for aircraft applications. Once the spray is applied, the stealth material does not have to be replaced, even after removing panels.

However, problems arose when the stealth material was not consistent once sprayed. Aircraft surfaces must be smooth because protrusions and indentations can reflect radar. With this initiative facing cancellation, the ManTech program provided \$5M to address the issue. The task team identified and fixed the root cause of the problem, and deployed the fix. ManTech eliminated variations in a spray-on stealth material process making technology transition practical. As a result, production consistently met undetected radar specifications and operation affordability of the material production was reduced from 26 to four weeks. Workload was reduced by eliminating the need to remove and replace 3000+ feet of tape around access panels. This radically reduced manual labor previously required for "electrical tuning." As a result, maintenance aircraft downtime went from one week to 30 minutes. The initiative increased B-2 mission readiness and cut maintenance hours per flight-hour by 50 percent.

ManTech Advances Affordability to Enable Warfighter to See First

Army Manufacturing Technology is providing the warfighter the capability to identify threats before the enemy can detect his presence. Third generation sensor systems will enable the Army to meet Future Combat System (FCS) requirements and provide rapid wide area search while on the move. In addition, sensor systems use multi-spectral aided target detection against difficult and obscure targets with detection and identification of threat targets beyond the enemy's detection capability. Affordable large format (1280x720), small pixel (20 um), dual band (MWIR & LWIR) third generation Focal Plane Arrays (FPAs) are key to enabling this objective capability for the high performance ground and air sensor systems of FCS.

The Army ManTech and U.S. Army Communications-Electronics Research, Development and Engineering Center, Night Vision and Electronic Sensors Directorate (CERDEC NV) demonstrated the Dual Band Focal Plane Array (DBFA) technology which is critical to leveraging mid- and long- wavelength bands simultaneously. Army ManTech:

- Reduced the infrared sensor weight from 120 pounds to less than 40 pounds
- Reduced the FPA costs 97 percent from \$705K to \$17K for the 640x480 format
- Reduced FPA costs 97 percent from \$1605K to \$60K for the 1280x720 format

- Reduced size from 3900 cubic inches to 1000 cubic inches

The Army ManTech affordability advancements for the DBFA manufacturing translate into more than \$298M net present value for production of more than 5600 systems translating into a direct impact on Future Combat Systems Incremental Spirals (Reconnaissance and Surveillance Vehicle, Mounted Combat System, Unmanned Aerial Vehicles), Mini-Long Range Advanced Scout Surveillance System (Mini-LRAS3), Stryker, AN-ZSQ-2, AH-64 Apache Helicopter, and the Armed Reconnaissance Helicopter (ARH).

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7. Programs and Actions to Sustain Capabilities

In 2006, the Department acquired and/or maintained facilities, equipment, or components, or took other actions needed to meet projected and actual military contingency requirements.

- During Operation Iraqi Freedom, the demand for UH-60 windshields of 100 sets (200 each) per month exceeded PPG Aerospace's capacity. This capacity constraint caused serious backorder problems. To remedy this situation, DLA funded an additional Nesatron windshield coating vacuum chamber for PPG. The new Nesatron Chamber was installed in March 2006; production startup began May 9, 2006. PPG's production was limited to 60 sets (120 each) per month prior to the installation this Government Furnished Nesatron Chamber. As a result of DLA's investment, PPG can now produce 100 sets (200 each) per month.
- DLA funded an investment for rapid deployment force protection barriers, or bastions, for a second year commitment through the Warstopper Program to pre-position raw materials to allow HESCO (a sole-source supplier in the United Kingdom) to begin immediate ramp-up during wartime production. HESCO has secured a non-woven geo-textile liner, the most critical material needed in regards to lead-time, from its U.S.-based textile source, SI Geosolutions from Chattanooga, Tennessee. With the completion of second-year funding, HESCO will complete the pre-positioning of all materials by adding steel components to meet the surge and sustainment requirements under the current contract.
- DLA invested \$33.5M in medical contingency contracts to gain guaranteed immediate availability of up to \$303M worth of pharmaceutical and medical/surgical items identified by the Services as go-to-war shortfalls. This coverage increases to a total of \$594M, over a six-month period, if all "refresh" options are exercised.
- DLA invested \$10.1M into an Industrial Base Maintenance Contract (IBMC) to Meridian Medical Technologies (MMT) to maintain a warm base in order to increase production capacity to satisfy the Services wartime requirements for Nerve Agent Antidote Auto-injectors (NAAA). Normal peacetime production is 200,000 auto-injectors per month or 946,000 in 142 days. Wartime support requires 5,000,000 auto-injectors in the same five-month period. Neither MMT, nor any for-profit business, will maintain idle excess plant capacity of 526 percent on the potential that the Department may buy additional NAAA product to go to war. The IBMC pays MMT to maintain this excess plant capacity and to rotate components for auto-injectors that have been purchased and stored at MMT for use in contingencies.
- DLA invested \$1.5M of Warstopper funds into the Nerve Agent Antidote Auto-injectors (NAAA) Service Life Extension Program (SLEP) to obtain 100 percent of the total auto-injector requirement. The IBMC described earlier satisfies only 61 percent of the requirement. Two additional initiatives provide funding for

management and remarking of the Services' NAAA stored at Meridian Medical Technologies (MMT) that are at or beyond their initial expiration date, yet remain potent. All auto-injectors in SLEP can be reallocated by Defense Supply Center Philadelphia to satisfy Service surge requirements.

- DLA invested \$102,000 for the NAAA Readiness Enhancement Program (REP) initiative to recruit, test, hire, train, and retain a pool of twenty-five personnel to staff on 24-hours notice the second shift at the MMT production facility in St. Louis, MO. The second shift has been employed almost full-time satisfying the Services' short notice requirements.
- DLA negotiated "No Charge" Surge coverage in 398 new FY06 contracts. This coverage represents a cost avoidance of just over \$7.8M—funds that neither DLA nor the Services will have to expend to insure that critical war/contingency items will be available. Examples of items included in the new FY06 contracts include small arms, engine and vehicular components, and hydraulic fluid.